PROSPECTUS

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CONTENTS

1. Welcome Note from the President of NUSU 05
2. Acknowledgements 07
3. What is the National University-Sudan? 09
    a. Mission, Vision and Values Statements 09
    b. Documents 09
    c. Investor's Corporation and Board of Trustees 10
    d. Rights 10
    e. Entrance Requirements 11
    f. Staff and Recruitment 11
    g. Location and Site Map 12
    h. Learning Environment 13
    i. Program Fees 13
    j. Faculties 17
    k. GRADUATE STUDIES 441

Faculty of MEDICINE 19

Faculty of PHARMACY 49

Faculty of DENTISTRY 81

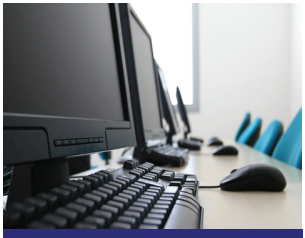
Faculty of RADIOGRAPHIC TECHNOLOGY & MEDICAL IMAGING 107

Faculty of NURSING AND MIDWIFERY 133

Faculty of MEDICAL LABORATORY SCIENCES 155

Faculty of PHYSIOTHERAPY 187

Faculty of ADMINISTRATIVE SCIENCES- Business Administration, Marketing, Accountancy, Business Information Systems 209



Faculty of COMPUTER SCIENCE AND INFORMATION TECHNOLOGY 243

Faculty of ENGINEERING: Civil Engineering, Electric and Electronic Engineering, and Architecture and Building Technology 267

Faculty of INTERNATIONAL RELATIONS & DIPLOMATIC STUDIES 273

Faculty of GRADUATE STUDIES 239

National University - Sudan

Welcome

Welcome

Note from The President of NUSU

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01

This is the 4th Edition of the PROSPECTUS of the National University-Sudan (NUSU). In this document registered students will find information about the mission, vision and values of NUSU, and all programme details and activities. This edition includes both UNDERGRADUATE and GRADUATE course outlines. NUSU aims at high-class education in medical, technological and social sciences. This is reflected in this comprehensive outline. It describes the basis of NUSU's educational philosophies, programme objectives including the characteristics of the graduate, strategies and methods, degree structure, semester duration and credit hour load and brief outline of content. This represent a narrow window into the complex organization of NUSU. More information on rationale of modules, behavioural objectives, and assessment can be found in the curriculum of each Faculty. The calendars, year plans and timetables are issued for each semester with the exact dates for teaching sessions, other learning opportunities, assessment, feedback and holidays.

NUSU is now 14 years old. It is still developing, and trying to set traditions of availing all activities in its publications, that may remain relevant for 3-4 years, before new editions are issued. The councils and committees of NUSU, while compiling this, are drawing their experience from local

and world-wide, up-to-date educational practices. Concurrently, other documents (Student Manual, Staff Handbook, Induction packages, and policies and procedures) are re-written and updated, in view of the emerging concerns about student welfare, environment, students with special needs, and virtual online educational resources.

There is strong focus on synergy between modern education, developmental needs and employment market requirements. This has laid down a wide area of maneuvers in the choice of specific disciplines and modules. In each discipline, a detailed career advice has been added in this edition to show students the opportunities available if they chose to be employed or opt to start their own business to employ others.

The reputability of NUSU has attracted students from about 25 countries and all continents. This representation requires quality of premises and services, as well as understanding of diversity, inclusiveness and considerations for non-discrimination in the educational activities and campus life. International students and the Sudanese students whose families are living outside the Sudan, receive special induction, supervision and directives by the Deanship of Student Affairs, and regular courses shown in this prospectus as Sudanese Studies.

It is my pleasure to invite all qualified students to join NUSU's exciting new and innovative educational programmes. Students, parents and sponsors are welcome to visit the campus. The will receive guidance from the HELP DESK at the Main Gate. They will be escorted to buildings and connected with the leadership of the university or faculties. Our primary target is to create guest satisfaction. Your comments and feedback are important for us, to continue improvement to meet our goals.

Last, but not least, we would like to invite our higher education colleagues, inside and outside the Sudan, to read this publication. Our special request: please have a critical look at this and show us our faults. You may suggest means of correcting them, and tell others about the positive and bright spots of this attempt. Your advice will be highly appreciated.

Prof. Qurashi M. Ali PhD, MD, FRCPE
President, National University, Sudan

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ACKNOWLEGEMENTS

02

World-wide, the overall innovations and their modifications stem out from the efforts of Professor Bashir Hamad. Every page of our documents could not be finalized, or brought to fruition, without his fatherly approval and comments or traces of his educational spirit. His direct and indirect contributions to the curriculum of this University and continuous encouragement are gratefully acknowledged, particularly those related to educational strategies, instruction and evaluation. The following have reviewed and reorganized the final versions of this prospectus: Prof. A/Rahman Eltom MD,PhD, Prof. A Rahman Biri MD FRCP, Prof. Elthami Abdul Mageed PhD, (medicine), Hassan M. Ali PhD, Dr. Ahmed Abusham PhD and Dr. Salah Ibrahim PhD, and Dr. Fatma Mukhtar MSc. (pharmacy), Dr. Kamal Khalil MD.Dr. Elfatih A Mageed MD (physiotherapy), Dr. M. A. Siddiq PhD. Prof. Awad Haj Ali PhD. (computer and health informatics program), Prof. Ibrahim Ghandor and Dr. Abdalla Darous, Dr. Enas Badawi PhD, Dr. Arif Affan (dentistry), Prof. Sayda H. Elsafi MD, PhD and Dr. Nihal Mirza MD, Dr. M. Sirelkhatim, Dr. M. Abdelgadir, Dr. Maha Magoub (medical laboratory sciences), Dr.Abdel Moneim Saeed PhD, Dr. M. A. Elsheikh PhD Dr. Elsir Ali Saeed PhD, Dr. M. Elfadil PhD (imaging technology), Prof. Awatif Ahmed PhD, and Ms. Fatma Bhruddin MSc, Dr. Sumia Ibrahim PhD (nursing and midwifery), Prof. Salih Faghiri PhD, Prof. Omer Elmagli PhD, and Prof. Hassan Kamal PhD, Dr. M. A. Osman, Dr. Mutaz Suliman, Dr. A Azim Almahal PhD, and Prof. A Gadir M. Ahmed PhD (management sciences). The contributions of Dr. Nadir Hasanain {Engineering) , Prof. A Latif Elboni and Dr. Ibrahim Mirghani (International Relations) are outstanding.The list, of those who, knowingly or unknowingly, contributed curricular details or ideas registered in Editor's memory or documents, is exhaustive. Our thanks are to the following professors: A/Hameed Lutfi, M.Y. Sukkar, Elbagir Ali El Faki, Amir El Mubarak, Omar Abdul Aziz, Othman Taha, Othman Khalafalla, Ali Habbour, Omar A. Mirghani, Awadelseed Mustafa, Mubarak Majzoub, M. Awadalla Salih, Hafiz El Shazali, Jaafar M. Malik, Othman Hamour, Ali Karar, A/Alla A/Wahid, El Tayeb Abdul Rahman, Eisa Othman El Amin, Mamoun Homeida, Hassan M. Ahmed, Ali Abdul Rahman Barri, Ibrahim M. A/Rahim, Ahmed A. Muhammadani, Mukhtar El-Khatim, A/Rahman A/Hafeez, Sayed M. Ahmed, Awad A/Rahman El-Awad, M. Elamin El-Sharif, Kamal Zaki, A/Rahman El-Tom, Ghazi Salahuddin, Bakri Osman Saeed, Mohyddin Majzoub, Jamal Suleiman, Abbas ElKarib, ElGamri ElRadi, Salah M. Omer, Majid Mustafa, Muzamil Hassan A/Qadir, M. A/Rahim A/AAl, Khalid Musa, Bakri Musa Abdul Karim, Tahir Othman Ali, Omar Siddiq, Fathel Rahman Ahmed Ali, A.Moneim Sahal, Omar Habbal, Mickell Seefldt, Ara Teki-

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Most of the "Dentistry Curriculum" has been adapted, with permission, from experts all over the world, mainly deans and heads of departments in the Sudanese dental colleges, and institution in dental sciences. The outstanding effort of professors Ibrahim Ghandour, Yahya Eltayeb, Ibrahim Elkamil, Osman Elgindi, Ahmed Suliman, Abbas Ghariballa, Nadia A. Yahia, Elnur Ibrahim is gratefully acknowledged.

The Engineering curriculum has been designed by committees headed by Dr. Nadir Hasanain as dean and head of civil department, and valuable contributions by Prof. Seifeldin Sadig. The International Relations and diplomatic studies curriculum has been written first by Dr. Ibrahim Mirghani and has been edited and adapted to the national requirements by Prof. A Latif Albouni

The whole idea could not have seen the light without the encouragement of the Investors' Corporation and Board of Trustees of the National University, who spend days every week responding to routine and emerging issues of financing. On their behalf I would like to thank the genius and friendly contribution of Mr. Zahir Twahry for his artistic preparation of the 3rd and 4th editions and other NUSU publications. The final editing of most of the undergraduate manuscript has been skillfully and patiently carried out by Prof. A Rahman Osman Beeri, Secretary of Academic Affairs. The graduate prospectus has been compiled by Prof. M. M. A. Abulnur, Dean of Graduate Studies and Scientific Research, and Dr. M. Abd Al Kader and Dr. Hatem Al Rufaai.

WHAT IS THE NATIONAL UNIVERSITY?

03

1. MISSION, VISION AND VALUES

The **VISSION** of the National University is to be a world-class leading provider of private higher education in the Sudan, in the aspects of elegance of environment and structures, excellence of curricula and learning strategies, quality of management systems, commitment of investors and employees to customer satisfaction (students, relatives and regulators), distinguished graduates in academic, general ethical standards, and concern with professionalism and original research production.

The **MISSION** is to: (1) constantly strive to provide efficient and best-in-class professionals, in their specialties (2) meet and exceed our customer needs and expectations, and (3) stay ahead of the competition by creating safe and rewarding workplace facilities and innovating new quality output, services and relationships in transparent, honest and fair business.

The **VALUES** are : (1) obligations to treat the public and one another with personal and professional integrity, consideration and mutual respect, (2) commitment to honesty, truthfulness, respect for human dignity, and professional ethical behaviour, (3) fair treatment of all citizens and employees, with no discrimination on the basis of morphology or ideology (4) promotion of democracy values, hard work, perseverance, commitment to success, accepting responsibility and accountability for one's conduct and obligations, and (5) creating and maintaining a respected reputation and positive image in the community as a trusted partner through excellent care of the individual and family, and responsibility towards the community and environmental problems and concerns.

2. DOCUMENTS

The legal documents of the University include: (1) the University Charter, (2) Academic Regulations (3) Rules of Activity and Conduct (4) Study Fees' Regulations, (5) Employment Regulations, (6) National Employment Penalty Regulations, (7) Contracts and Salary Scale, (8) Job Descriptions, (9) Staff Handbook, (10) Students' Manual, (11) Quality Manual, (12) Teaching, Learning and Assessment Policy, (12) Prospectus and Curricula, (13) Organizational Chart, (14) Committee Structure, (15) Logbooks of students' skills and activities, (16) Year Plans, (17) Academic Calendars, (18) Programme Evaluation Forms, (20) Portfolio of Architectural and Structural Designs of Buildings, (21) External Examiners' Appointment, Reporting and Response documents and (22) numerous policies and procedures in areas of quality, safety, and non-discrimination.

3. BOARD OF TRUSTEES

The Board of Trustees (BOT) is formed according to the Charter to include the investors, the academicians, the representative of the Ministry of Higher Education, and public figures of interest in education or eminent in social accountability issues of universities. The current BOT is chaired by Dr. Taha Eltayeb A. Elimam, and includes in its membership: Prof. Qurashi M. Ali, Dr. Amin O. Sidahmed, Dr. M. Sirelkatim Ali, Prof. A-Rahman Osman Beeri, Prof. Osama A-rahman Elamin, Eng. M. Awadelkarim Elgasim, Dr. Elhadi Bakheet, Eng. Yousif A. Yousif, Prof. A-Moneim Algousi, Dr. Ismail Qurashi, Prof. Hassan M. Ali, Deans of faculties, and representatives appointed by the Ministry of Higher Education and approved by the President of the Sudan.

4. RIGHTS

4.1 GENDER RIGHTS

Throughout this manual (and the webpage) every effort has been made to use he/she, his/her, him /her. It may not be possible to assure that this fair use has been consistent. Any such unintended mistake should be taken to mean both sexes. Females have been addressed in situations of special concerns, in gender-specific issues, mainly out of respect for their specialized roles.

4.2 EXCLUSION OF LIABILITY AND DISCLAIMER

Throughout this manual (and the webpage) every effort has been made to ensure that expert, accurate and up-to-date guidance has been included. The administrative and academic authority continuously updates the NUSU data and academic regulations to satisfy the emerging needs, more quickly than publications would reflect. Approved changes are shown at the official notice-boards of the University. Accordingly, neither the Ministry of Higher Education, nor the NUSU administration, shall be liable to any person or entity with respect to any loss or damage caused or alleged to be caused by the information contained or omitted from this manual (or the webpage).

4.3 COPYRIGHTS

a. The curriculum timetable and course details resemble many of those (or may contain parts) in other colleges in which the “President of NUSU” has been the main or essential member in the bodies responsible for curriculum design and evaluation. In many an institution he has been one of the driving forces for innovation. These institutions include: University of Gezira (Sudan), Sultan Qaboos University (Oman), Omdurman Islamic University, Alzaeim Al-Azhari University, University of Medical Science and Technology, African International University, National Ribat University, Al-Razi University (Sudan), and Al Qassim University (Saudi Arabia). Major innovations have been added to improve on the experience of the above institutions. This manual (and the webpage), in addition to comprehensive compilations in each program document (to be given to each student) is an entity of its own. Therefore, the total set of details, which is not available in any other institution so far, may

not be copied or published without written permission from the National University- Sudan.

b. The teaching material available in the webpage, and other published material in the University notes, is original and should not be reproduced for commercial use, in any form without written permission of the National University- Sudan. Non-profitable teaching purposes are allowed. Our teachers and colleagues, who are mentioned in the "Acknowledgements", are free to use this material because it is all from them, we could not single out what is ours from theirs.

5. ENRANCE REQUIREMENTS

A. Applications must be through the Ministry of Higher Education (Sudan) Admission Directorate, based on passing a fresh Sudan (or equivalent) School Certificate or equivalent qualification (please see relevant booklets provided at that office). Older 5-10 years' School Certificates may be considered, if vacancies are there, and details are approved by the Admission Office. The newly introduced online application dismiss disqualified applicants automatically.

B. Direct applications are welcome, but will be entered online by the University to the Admission Directorate for approval.

C. International applications will be processed similarly, but candidates are advised to follow the application procedure in the webpage, and wait for a response, before arriving in the Sudan. The NUSU Administration takes 5 working days (after receipt of application) to finalize acceptance. Electronic communication is preferred. For security reasons. A student who is granted acceptance by the NUSU will NOT be allowed by the Ministry of Internal Affairs to transfer to any other university after arrival, except after studying and passing, at least, one academic year..

D. Mature students qualified with a previous health science professional degree may be considered. In this case early application is recommended (6 months before national intake in September every year), because of the time it may take for the approval of the School Certificate by Ministries of General Education and Higher Education, Sudan.

E. Final decision on acceptance depends on the results of an interview to confirm if the student has the aptitude to join a specialty, and is free from physical and psychological inabilities that are not compatible with the responsibilities of a specific or hardship profession. But individuals with special needs are welcome and will find NUSU a conducive environment of values against discrimination.

F. Transfer NUSU from other universities may be considered for enrollment in Semesters 2, 3, 4 or 5 only, based on the approval of the General Directorate of Admission in the Ministry of Higher Education.

6. STAFF AND RECRUITMENT

Academic and administrative staff interested in joining the National University-Sudan, may show their intention by filling the e-recruitment form included in the webpage. A response will

be sent by e-mail within 48 hours, and further instructions will follow. Appointment of academic staff is based on academic excellence in the areas of research and teaching. Academic applicants with no research records or grants will not be considered for full-time positions in this university. Full- and part-time staff list may be looked up in Academic Staff section of the webpage.

Applicants interested in joining other private educational institutions in the Sudan can reach them through our web-page. The employment conditions and salary scale are not (currently) available in this manual or website.

7. LOCATION AND MAPS

A. The Country: The best advantage of this National University is that it is located in the Sudan, an AfroArab country with rich human and natural life resources. The inhabitants are either Arabs or Africans.. The Sudan educational institutions are known, worldwide, for their academic excellence, ethical heritage and professional teaching perfection. A Sudanese national, wherever he/she may be is unique in considerateness, courtesy, and hospitality. In almost 80% of the country it is the safest in the world. A single lady can jog in Khartoum, or any other city, in the middle of the night unbothered. Sudanese abide voluntarily by strong moral codes and respect for females as foreigners. The media-nourished concepts of North-South or West-East conflicts have largely exaggerated the reality. The color of people has no significance in this country, may be the only country in the world where color has never and can never

be a real cause of conflict. Media are prototyping other countries' dilemmas on a local setup that has got some developmental problems. It is interesting that the Arabs in this country are mainly non-white, and the non-Arabs are not necessarily black, contrary to what the media have publicized. The luckiest person in the world, any moment, is the one who has been received by a Sudanese host.

B.

The City: The capital is Khartoum, a city made up of three cities striding the White Nile, Blue Nile as they join to form the River Nile. This has given it unique panoramic landscapes and scenery. There are about 4-6 million inhabitants, mostly in traditional houses, known for their spacious yards. Khartoum city is the official capital crowded with governmental offices, ministries, embassies and international organizations. There are some affluent districts where the price of a house may be as expensive as in New York or Tokyo, and other areas of modest housing. Therefore students have a wide range of choice. Transportation used to be a problem, now it is quite easy, but still, students are advised to find accommodation as near as possible to the University premises.

C. Premises and Environment : (See map). The National University permanent building is located in the Eastern part of Khartoum called Al Raqi District, near the Khartoum-Medani Highway, in an affluent newly established residential area. This region has an interlacing and frequent network of transport, yet the wide roads give no impression of crowdedness, or noise pollution. This accessibility is an invaluable asset for an educational institution. The University block, a purpose-built structure, assumes a masterpiece of architectural innovation (see pictures). The National University is open for students and staff for 18 hours working days and 6 hours on weekends. The library, self-directed learning facilities are available for registered students and staff. Limited access to research laboratories is allowed for certain students who are involved in staff's research projects. Certain sport facilities (Basket- ball and volleyball) are within the premises. In-door recreational facilities are available in the Cafeteria. The source of proud of the University is the design of beautiful, environment-friendly and heavy duty facilities that serve its mission. Students and employees are expected to respect and work towards achieving that. Directives from them to their visitors are very important to maintain and improve the level of standards of perfection we intend to reach. There are few similar, or near, buildings of excellence of space and quality, so far, in higher education institutions in the Sudan.

A 10-floor building of the teaching hospital stands next the main University block and accommodates over 300 beds with all tertiary care facilities. A 5-floor building accommodate the Faculty of Engineering. NUSU owns a 35000 M2 area in Albagair Suburban Area, in which a new campus is being built. It includes a rural hospital.

8. PROGRAMME FEES

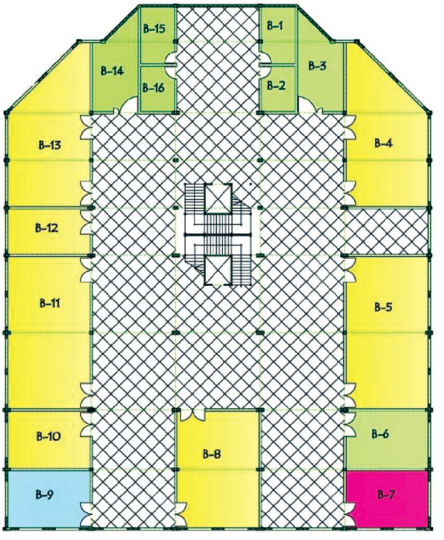
A list of tuition fees is published by the MHESR every year. Private institutions keep updating such list, but a student accepted in one particular academic year will NOT be charged with the fees published for fresh students. Fees cover teaching and administrative activities of the University including laboratories and in-campus training. Accommodation and food subsidies are NOT included. Transportation to and from the University or off-campus training sites is NOT included, but the University tries to provide that for selected activities. Additional fees are variable for compensations of absence or failure. Students pay for all courses and examinations [substitute or supplementary], scheduled in the Summer or Holidays, based on the credit hour load of the courses. Fees for such compensations are usually not published in Academic Calendar, but requested by students or their sponsors.

BUILDING PLAN SUMMARY

- 16 CLASSROOMS- 40-100 STUDENTS
- 10 LABORATORIES- 30-60 STUDENTS
- 2 AUDITORIA- 200-300 STUDENTS EACH
- 2 MULTIPURPOSE HALLS- 300 STUDENTS EACH
- 27 TEACHING STAFF OFFICES TO ACCOMMODATE OVER 48 STAFF MEMBERS
- 6 TECHNICAL STAFF OFFICES TO ACCOMMODATE 12 TECHNICIANS
- 1 MULTIPURPOSE HALL FOR PROFESSIONAL EDUCATIN UNIT

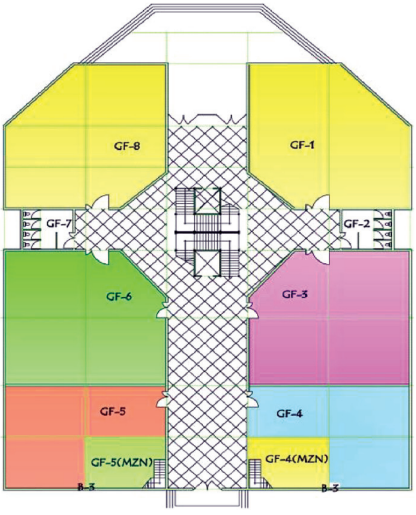
BASEMENT

B-1= Office- 2 staff members
B-2= Office- 2 staff members
B-3= Office- 4/ Seminar room- 20
B-4= Classroom [1]– 50-60
B-5= Classroom[2]- 80-100
B-6= Office/Seminar room-20
B-7= Electricity Control Panels
B-8= Classroom[3]- 60-80
B-9= X-ray machine + Dark room
B-10= Classroom[4]-40
B-11= Classroom[5]- 80-100
B-12= Classroom[6]- 20
B-13= Classroom[7]- 50-60
B-14= Office-4/Seminar room-20
B-15= Office- 2 staff members
B-16= Office- 2 staff members
Total students= 400- 520
Total staff = 6-16



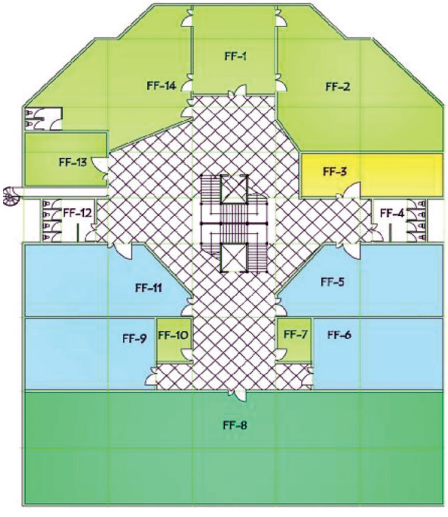
GROUND FLOOR

GF-1= Auditorium - 250 -300
GF-2= Male toilets- 3 seats + 5 WBs
GF-3= Laboratory 100
GF-4= Dental Clinic 15 chairs
GF-4 MZ= Office-6/Seminar room-20
GF-5= Dental clinic- 15 chairs
GF-5 MZ= Office-6/Seminar room-20
GF-6= Laboratory 100
GF-7= Female toilets- 3 seats +5 WBs
GF-8= Auditorium- 250-300
Total students = 1200-1420
Total staff= 12



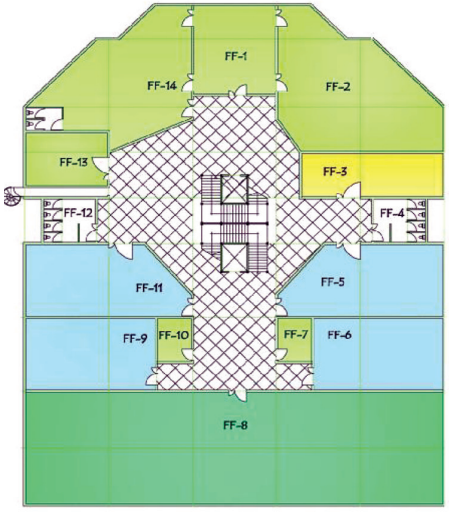
FIRST FLOOR

FF-1 = Faculty of Medicine Secretariat
FF-2= Office of Dean of Medicine
FF-3 = Senior Registrar
FF-4 = Males toilets- 3 seats+ 5 WBs
FF-5= LAB-2. Chemistry/Pharm chemistry - 45
FF-6= Library
FF-7= Office/store
FF-8 = Main library- 400
FF-9 = LAB-4.Computer, Elect . Library- 45
FF-10= Office/store- Network control
FF-11= LAB-5. Biochemistry/ Physiology- 45
FF-12= Female toilets
FF-13= Faculty of Medicine staff
FF-14= Financial Control Office
Total students= 680
Total technical staff= 12



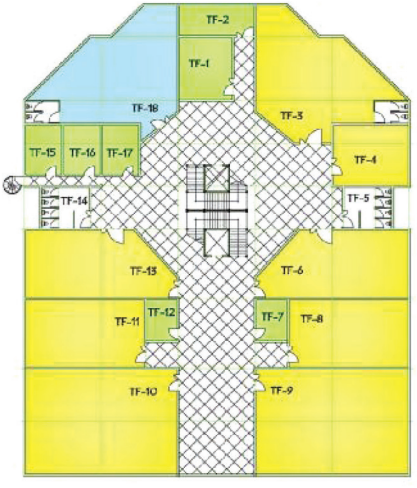
SECOND FLOOR

SF-1= Dean of MLS
SF-2= Mosque
SF-3= Male toilets
SF-4= LAB-6 Haematology / Microbiology
SF-5= Office/store
SF-6 [1-13] = staff offices-13
SF-7= Classroom[8] - 250
SF-8= LAB-8. Dental Phantom Head- 20
SF-9= Office/store
SF-10= LAB-9. Histology/Pathology/ Physiology-
SF-11= Female toilets
SF-12= Office-2
SF-13= Office-2
SF-14= Dean of Pharmacy
Total students = 464
Total teaching staff= 21
Total technical staff= 4



THIRD FLOOR

TF-1 = Office-6/ Seminar room-20
TF-2= Office-6/Seminar room-20
TF-3= Dental Material Lab
TF-4= Classroom [10]-40
TF-5= Male toilets
TF-6=Classroom [11]-120
TF-7= Office/store
TF-8= Classroom [12]-80
TF-9= Computer Lab 200
TF-10= Computer Lab 200
TF-11= Classroom [15]-80
TF-12= Office/store
TF-13= Classroom [16]- 120
TF-14= Female toilets
TF-15= Office-2
TF-16= Office-2
TF-17= Office-2
TF-18= Dean of Dentistry
Total students= 1240
Total teaching staff= 18
Total technical staff= 4



National University - Sudan

Faculties

FACULTY OF

MEDICINE & SURGERY

UNDERGRADUATE
& GRADUATE
PROSPECTUS

MEDICINE AND SURGERY

VISION AND MISSION

The Faculty of Medicine, National University - Sudan strives towards developing the highest standards of academic and clinical excellence. The various parts of this Programme aim to produce ethically responsible, innovative, critically thinking professionals committed to meeting the health and developmental needs of all communities in the Sudan and the rest of the world, appropriately and efficiently. The me teach co the students how to learn and continue as lifelong learners. The Programme aims to be the most respected of its kind, as evidenced by high quality of premises, up-to-date administration and governance, job- and research-directed instruction, to produce a very high quality of graduates in their ethical, professional and scholarly contribution.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Medicine, has to:

1 - Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.

3 - Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Medicine.

4 - Pay the published fees of 90,000 SDG or 8,400. [international students] (2019)

CAREER ADVICE

Students qualified with this bachelor degree [MB BS] pass through the track designated by the Sudan Medical Council, and so are temporarily registered with the Council. After working for a period defined by the Ministry of Health in each discipline/specialization, graduates sit for

the licensing exam to obtain permanent registration with the Sudan Medical Council. Qualified grads serve as general practitioners in the public or private sector. They may upgrade to MD/ PhD or licenses in basic sciences from public view in the public or private sector, and can qualify for doctor's degree programmed or fellowships in basic sciences anatomy, physiology, and biochemistry) or clinical sciences (medicine or its sub-disciplines, surgery and sub-disciplines, obstetrics, gynecology, paediatrics, and oncology) or diagnostic (pathology, immunology, microbiology, radiology and ghost imaging) or community medicine (community medicine and public health, health statistics, and forensic medicine) to qualify as a consultant in any of the mentioned disciplines to work in the healthcare services and/or in university teaching. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence

FACULTY OBJECTIVES

The objectives of the National University Faculty of Medicine are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National University philosophy and message.
2. Graduate a practitioner with a Bachelor of Medicine and Surgery (MB BS), with strong community orientation and ethical components.
3. Contribute to community development through health services provided in its own health institutions and other institutions co-operating with it, through the following: (a) partnership in designing health programmed and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) sontribution in continuous education through short and long term courses, to improve efficiency of health workers, and (c) Nrovision of essential equipments and supplies to improve quality of services, through partnership with the Ministry of Health.
4. Strengthen medical and health research, making use of the University's accessibility and communication privileges.

CURRICULUM OBJECTIVES [Characteristics of the medical graduate]

A graduate of the National University Medical Curriculum should be able to :

1. Adopt the strategies of the National University-Sudan and abide by its objectives and rules stated in its charter.
2. Observe in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Medical Council), and maintain good and honest relations with his/her patients, their families, his/her colleagues across all sectors involved in health.
3. Appreciate the value of diversity and multi-ethnicity in solving health problems with emphatic, humane and fair practice.
4. Diagnose and manage cases of endemic and epidemic diseases, and other health problems preva-

lent at the level of the individual, family or society, with special emphasis on the nutritional and environmental problems common in developing countries, and plays an active role in health promotion.

5. Integrate basic, community and clinical sciences in solving community, family and individual health problems.
6. Use scientific knowledge in diagnosis and management of health problems, according to known methods of problem solving and integration, and explains the scientific structural (anatomical), functional (physiological, biochemical), morbid (microbiological, pathological), and therapeutic (pharmacological) background related to the problems [problems in integrated medical sciences, clerkships], with full awareness of evidence-based practice.
7. Manage emergencies, and decide and act properly on cases needing referrals to specialized centres or personnel. Be aware of ambulance and patient transfer facilities and contacts.
8. Accepts to work in all settings according to needs, and act to improve health service delivery systemx both quantitatively and qualitatively.
9. Encourage community participation and act in recruiting various sectors in defining health and health-related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices, and remain accountable to their society.
10. Adhere to “health team” approach, acting as an efficient member, capable of its leadership, dividing labor and responsibilities among its members, and ensuring both effectiveness and homogeneity among the members.
11. Administer a health “unit” or “centre” efficiently according to scientific, medical, statistical, economic and legal bases.
12. Continue to consider elements of efficiency, costing and economic implications in his/her diagnostic and therapeutic choices.
13. Acquire the skills of teaching, learning and communication efficiently to carry out her/his duties in health education and in winning the confidence of patients and their families and societies.
14. Acquire the skills of self-learning, and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/her colleagues in the health team.
15. Carry health or health-related research, alone or with a health team, using scientific methods known in such activities.
16. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career.
17. Acquire postgraduate qualification in the discipline of his/her choice, recognizing the needs of the society for certain specialties, particularly general practice and family medicine.

EDUCATIONAL STRATEGIES AND METHODS

The learning strategies emphasize the following: (1) early acquisition of basic clinical skills-including communication, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problemoriented learning, (4) community-ori-

ented and community-based activities, (5) integration of basic science, community and clinical practice in a multidisciplinary approach, (6) self- and peer education and evaluation, (7) team-work approach, (8) a wide range of electives, (9) continuous evaluation, (10) preparation for continuous education.

The Faculty of Medicine adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions -once/ week at least, (3) field practice in rural and primary health care settings and societies not less than 1/5th of the timetable, (4) practical sessions (laboratory, clinical) not less than 1/4th of the curriculum timetable, (5) skill laboratory (weekly) sessions, (6) lectures -not more than 1/3rd of the curriculum timetable (not more than 3 lectures/day), (7) educational assignments, reports and research activities (as many as the programme and time would allow), (8) electives -about 10% of the curriculum timetable- (about 2 hours/semester).

Feedback to students after mid-course and end of course assessment is an essential part of the medical programme

TIMETABLE

The programme is of five years' (10 semesters') duration divided into three phases, comprising about 200 CHs. A semester is 18-20 weeks in Phase 1 and 2, and 22-24 weeks in Phase 3. There are three compulsory Summer courses and at least five electives; credit hours of electives taken by the student will be included in the total.

Semester 1 [21CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
	ORIENTATION		1				
1	Sudanese Studies -1	ME-SUDN-110	All semester	2	-	-	2
2	Islamic Studies -1	ME-ISLAM-111	All semester	2	-	-	2
3	Arabic anguage-1	ME-ARAB-112	All semester	2	-	-	2
4	English Language -1	ME-ENG-113	All semester	2	-	-	2
5	Computer Science -1	ME-COMP-116	-	1	-	-	2
6	Computer Science -2	ME-COMP-124	2	2	-		-
7	Introduction to Medicine & Medical Education	ME-EDU -114	2	1	-	1	2
8	Sudanese Studies -2	ME-SUDN-120	All semester	2	-	-	3
9	Islamic Studies -2	ME-ISLAM-121	All semester	2	1	1	2
10	Arabic Language -2	ME-ARAB-122	All semester	2	1	1	2
11	English Language -2	ME-ENG-123	All semester	2	-	1	2
			16	20	2	4	21

Semester 2 [24 CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Physics for Medical Equipments & Investigation	ME-PHYS-115	3	2	-	-	2
2	Basic Biochemistry	ME-BIOCH-118	3	2	-	-	2
3	Genetics & Molecular Biology	ME-GET-119	2	2	-	-	2
4	Biostatistics	ME-STAT-117	All semester	2	-	-	2
5	Introduction to Medical Ethics	ME-ETHIC-226	All semester	2	-	-	2
6	Man and His Environment	ME-ENV-127	4	1	-	1	2
7	Human Growth & Development	ME-GROW-125	3	3	2	-	4
8	Behavioral Science	ME-BEHAV-128	3	2	_	-	2
9	Principles of Disease -1	ME-DIS-212	3	1	-	1	2
10	Medical Entomology & Parasitological	ME-PAR-125	3	1	-	1	2
			24	18	3	3	22

Examination of longitudinal courses (+re-sits) 2 weeks

SUMMAR 1: Medical records and data collection (ME-SUM-131) = 2 CHs Elective (E-132): A 1000 -word report on “Internet Sources of Health Sciences” 2CH

Semester 3 [20 CHs - 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-1	ME-SKIL-211	All semester.	2	-	-	2
2	Principles of disease-II	ME-DIS-212 B	3	2	-	1	3
3	Immunology	ME-IMM-216	2	2	-	-	2
4	Blood and lymph	ME-HEM-316	3	2	-	1	3
5	Cardiovascular system	ME-CVS-214	6	3	1	1	3
6	Respiratory system	ME-RES-213	5	3	1	1	3
7	Medical ethics	ME-ETHIC-226	2	2	-	-	2
			21	16	2	4	18

Examination of longitudinal courses (+re-sits) 1 week

FIRSt YEAR PROGRAMME EVALUATION

Semester 4 [17 CHs- 21 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-2	ME-SKIL-221	All semester.	-	-	2	2
2	Primary health care	ME-PHC-215	3	1	-	1	2
3	Musculoskeletal system	ME-MSK-223	5	1	1	2	4
4	Nutrition and metabolism	ME-NUT-224	4	2	1	-	3
5	Gastrointestinal system	ME-GIT-225	6	2	1	2	5
6	Basic Epidemiology	ME-EPI-312	2	2	-	-	2
			20	12	2	4	17

Examination of longitudinal courses (+re-sits) 1 week

SUMMAR 2: Research methodology and scientific writing (ME-SUM231) 2 CHs Elective (E232): Draw a map of health services in one Mu'tamadiya =2 CH

SECOND YEAR PROGRAMME EVALUATION

Semester 5 [18 CHs- 19 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-3	ME-SKIL-311	All semester.	-	-	2	2
2	Research Methodology	ME-SEARCH-227	2	2	-	1	2
3	Graduation Project	ME-EPID-215	3	3	1	1	3
4	Urinary system	ME-URO-313	6	3	1	1	5
5	Endocrine system	ME-ENDO-315	4	3	-	1	4
6	Reproductive system	ME-REP-314	4	2	1	2	5
			18	10	3	6	18

Examination of longitudinal courses (+re-sits) 1 week

Semester 6 [20 CHs- 21`weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-4	ME-SKIL-321	All semester.	-	-	2	2
2	Head and neck	ME-HAN-322	3	1	-	1	2
3	Nervous system and special senses	ME-CNS-323	8	4	1	3	8
4	Tropical medicine	ME-TROP-324	4	1	-	1	2
5	Basic therapeutics	ME-PHARM-325	4	4	-	-	4
			20	11	1	8	20

Examination of longitudinal courses (+re-sits) 1 week
SUMMAR 3: Rural Hospital Residency (ME-SUM-331) 2 CHs Block 2 weeks
Elective (E332): A 1000 work essay on management of an emergency 1 CH
THIRD YEAR PROGRAMME EVALUATION
Phase 3: Clinical clerkships

Semester 7-10 - Clerkships or Hospital Department Rotations=76 CHs

Four semesters, 16 modules of four major rotations, five longitudinal courses including two elective.

#	Rotation Groups	Disciplines (symbol-number)	Credit Hours	Duration (weeks)	Longitudinal Courses
1	A	Internal Medicine (ME-MED-411)	14	12	
2		Dermatology (ME-DERM-413)	2	2	
3		Emergency Medicine (ME-MER-412)	4	4	
4	B	General Surgery (ME-SURG-421)	12	12	
5		Orthopedics (ME-ORTOP-422)	4	4	
6		Ophthalmology (ME-OPTAL-423)	2	2	
7		Ear, Nose and Throat (ME-ENT-424)	2	2	
8	C	Family Medicine (ME-FAM-513)	4	4	(16) Elective-British-American Professional Examinations-(E-524) 2 CHs (Semester 9 & 10) (17) Evidence-Based Medicine (ME-EBM-525)- 2 CHs
9		Psychiatry (ME-SYC-512)	12	12	
10		Obstetrics and Gynecology (ME-OBGYN-511)	3	3	
11		Pediatrics (ME-PED-521)	2	2	
12		Forensic medicine (ME-LAW-522)	2	2	
11	D	Medical professionalism (ME-PROF-415)	11	11	
12		Health Economics and Hospital Management (ME-HM-523)	2	2	
13		Radiology and imaging (ME-RAD-414)	2	2	

Rotation of the groups is as follows:

Semester 7 = A	B	C	D
Semester 8= B	C	D	A
Semester 9= C	D	A	B
Semester 10= D	A	B	C

CLERKSHIP EVALUATION AND GRADUATION

IMPORTANT

Detailed specific objectives can be seen in the Medical Curriculum Manual. A clerkship booklet is provided to students in the first session in the clerkship. It is the students' responsibility to work towards achieving the objectives included, irrespective of the educational activities offered during the block. The objectives represent the minimum required competences for these clerkships.

COURSE OUTLINE

Detailed behavioural objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included below:

Phase 1: Semester 1, Preliminary Courses (College Requirements)

Islamic studies (ISLAM-121) - 4 CHs longitudinal (See ISLAM-111).

Arabic language (ARAB-122) - 4 CHs, longitudinal (See ARAB-112)

English language (ENG-123) -4 CHs longitudinal (See ENG-113)

Title	Code	Semester/Duration	Credits
ISLAMIC STUDIES	ISLAM-111+121	Longitudinal /1	2+2

This is a National Requirement compulsory to all Muslim students, which includes two courses: 111 in Phase 1, and 121 in Phase 2. Their contents are: (1) the recitation of two Suras of the Holy Quran, which introduces a lot of behavioral and ethical issues for mankind as well as for Muslims, (2) the basic sources of religious thought and religious groups, (3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that may arise from emerging issues that require ethical discussion, leading to better understanding between individuals in groups, to live in a peaceful and constructively save environment and society.

Title	Code	Semester/Duration	Credits
ARABIC LANGUAGE	ARAB-112+122	1/ Longitudinal	2+2

This is a National Requirement compulsory to all Arabic speaking students, which includes two courses: 112 in Phase 1, and 122 in Phase 2. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE	ENG-113+114	1/ Longitudinal	2+2

The sources of most health information in the World are in English. The Internet navigation to

obtain information is basically in English. Some of the patients, attending clinics in Sudan, may only speak English language, especially with open-up of borders with economic development and of globalization. Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: (1) correct pronunciation of medical terms, (2) correct reading and understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some pieces from English to Arabic, and others from Arabic to English, both from medical literature..

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES 1,2	SUDN-110+120	1/Longitudinal	2+2

This is a National Requirement compulsory to all Students, which includes two courses: 110 in Semester 1, and 120 in Semester 2. It includes: (1)the geographic profile of the Sudan, (2) classification of the population and their distribution all over the country, (3) discussion and comparison of the various historical era of the Sudan, (4) main features of Sudanese economy, (5) educational policies and administrative rules in the country, (6) political systems that has governed the Sudan, (7) the legal system, (8) Sudan identity and culture, (9) elements of unity and harmony in social fabric, and (19) issues of diversity and cultural unity.

Title	Code	Semester/Duration	Credits
BIOSTATISTICS	STAT-117	2/ Longitudinal	2

A two-week module on basic statistics as applied to health, to include: (1) introduction to statistics, (2) probabilities, (3) data summary, (4) presentation; measurement of central tendency; interpretation of variation (dispersion), (5) population means, (6) normal distribution; confidence interval, (7) frequency distribution, (8) sampling techniques, (9) calculation and interpretation of the concept of confidence interval, (10) the concept of p-value and its interpretation, (11) the normal and skewed frequency distribution of biomedical data, and (12) how to apply the appropriate test of significance for a given data set and a given research methodology (using t test as an example).

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCE-1,2	COMP-116	1/Block 4 weeks	2+2

This is a 2-week block that introduces the following facts: (1) textbooks of medicine and allied sciences are available on CDs, in which a large volume of knowledge is saved and easily retrievable, (2) there are many software packages demonstrating methods and techniques in clinical skills including patient rapport in history taking, clinical examination, investigations and management, (3) students and teachers access the internet for the unlimited sources of information, both at their professional level and public level for health education, (4) students and future doctors are educators who have to prepare smart documents and presentations for the health

team and profession at large, (4) knowledge of programmed like Word, Excel, and PowerPoint is indispensable for anyone learner or teacher, (5) computer is important for students both in the developed or developing world, more so for the latter, who might not have inherited voluminous libraries in their colleges and have to utilize the virtual libraries available all over the world, (6) medical journal as hard copies are difficult to be owned by one institution, now, most are available on-line for those who can use the computer efficiently.

The course is intensive focusing on the basic principles of (1) computer electronics and applications relevant to health science education, (2) hand-on experience in dealing with famous programmed like DOS, Word, Excel, PowerPoint, Access and Internet Explorer, (3) the use of CDs is extensively covered as well as having e-mails and navigating the internet for health information, (4) how to access medical journals, and communicate with scientists worldwide.

Title	Code	Semester/Duration	Credits
PHYSICS FOR MEDICAL EQUIPMENTS AND INVESTIGATIONS	PHYS-115	2/Block 3 weeks	2

The basic principles of general physics are important for understanding certain mechanisms that take part in the human body, and also, the technical background of many medical types of equipment. A medical professional is often confronted with a method of investigation or intervention that is based on physical or mechanical process in the human being and he/she has to deal cautiously with the machine and use it correctly considering its proper maintenance and patient's and worker's safety. These include physical chemistry, gas laws, physics of light and sound, and radiation. The details of the contents include; (1) physical quantities and units, (2) measurements techniques, (3) gases and gas laws, (4) waves, (5) optics, and (6) radiation.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICINE AND MEDICAL EDUCATION	ME-EDU-114	1/Block 3 weeks	2

This is a three-week (2 CHs) block, starting with a simple medical problem that emphasize: (1) the meaning and message of health and health care delivery system in the country, (2) the role of the physician in, other professional and administrative staff in health care, (3) priority health problems, (4) concepts and principles of learning, (5) adult education and learning, (6) student centred learning, (7) problem-based learning, (8) instructional techniques (lecture, small group etc), student assessment methods, (9) holistic approach, inter-disciplinary and partnership concepts, (10) curriculum development, (11) programme evaluation, (12) leadership and (13) professional ethics. Students are divided into groups to spend a week in a health facility, hospital theatre, hospital outpatient, health centre, various directorates and departments of Federal and State Ministries of Health, etc.. Meanwhile students are given discussion sessions on group dynamics and instructional methods, at the end of the course the groups present their field activity using a suitable audiovisual technique. Evaluation assesses the knowledge and attitudes of the students in these three areas: health system, group dynamics and instructional methods.

Title	Code	Semester/Duration	Credits
BASIC BIOCHEMISTRY	BIOCH-118	2/Block 3 weeks	2

A three-week block in Semester 2, to include: (1) structure of essential macromolecules, (2) biological molecules which play important biomedical roles, (3) different types of carbohydrates, (4) physical and chemical properties of carbohydrates, proteins and lipids, (5) classification of amino acids, polypeptides and proteins, (6) the role of three-dimensional structure of proteins in protein function, (7) the nature of catalysts and enzymes and their roles in chemical reactions in the living cells, (8) properties of enzymes and their classification, (9) the differences between simple, complex and derived lipids and their biological importance, (10) the nitrogenous bases: purine and pyramidine, (11) types of nucleotides- purines and pyramidines, (12) types of molecules of nucleic acids, (12) in vitro distinction between the different types of carbohydrates, (13) in vitro detection of carbohydrates and amino acids in given material.

Title	Code	Semester/Duration	Credits
GENETICS AND MOLECULAR BIOLOGY	ME-GENT-119	2/Block 2weeks	2

A two-week block in Semester 2, that considers the structure and function of the DNA and organization of human genome and molecular biology in health and disease. It will include: (1) atomic structure, (2) protein synthesis, (3) chromosome structure, function and structural defects, (4) basic pathways and mechanisms in biological energy transduction and oxidation of metabolites to synthesis of ATP, (5) role of major gene regulatory proteins and molecules including signal transduction and cell cycle control, (5) common features of genetic diseases, and give difference examples of types of genetic diseases (6) properties of cancerous cells as relation to mutational changes, (7) molecular diagnosis and research, (8) human genome project, (9) forensic genetics, and (10) ethics in genetics and stem cell research.

Phase 2: Semesters 2-6, Organ System Courses

Title	Code	Semester/Duration	Credits
MEDICAL ENTOMOLOGY AND PARASITOLOGY	ME-PAR-125	2/Block 3 weeks	2

Insects have tremendous potential for transmitting disease in human and other animals. The disease-causing organisms include protozoa, viruses, bacteria, and worms. The most deadly disease worldwide is malaria which is transmitted by mosquitoes. Mosquitoes can also transmit viruses (including those causing encephalitis) and filarial nematodes. Other vectors include flies and tics.

This is a three-week (3 CHs) block, concerned with: (1) vector and organisms surveillance and control, considering the operational control personnel as one of the health team, (2) special emphasis on insects and closely related arthropods that impact human health, (3) the life cycles of the vectors and parasites, their geographical distribution, ecology, and (4) the epidemiology, presentation and broad management and control of the diseases caused by them. These include parasites of the intestinal tract, blood-borne parasites and those found in other body sites.

Title	Code	Semester/Duration	Credits
GROWTH AND DEVELOPMENT	ME-GROW-126	Block 3 weeks/2	2

This is a three-week block on: (1) general embryology: (a) reproductive organs, (b) gamete formation, (c) fertilization, (d) implantation, (e) organogenesis, (2) subsequent morphological changes in the human development during: (a) prenatal, (b) postnatal, (c) childhood, (d) pre-school, (e) school age, (f) adolescence, (g) adulthood and older age (both physical and psychological) changes, (3) teratogens and congenital anomalies. Students should visit various health institutions to learn about (1) antenatal setup, (2) labor room, (3) child care Centre and growth monitoring charts, (4) milestones and abnormalities of physical growth, (5) maternal and child health care,(6) geriatric care. Students should become familiar with the special features of all these stages and also gain knowledge about (7) the role of health care providers at the different phases of human life in accordance to the specific needs of each phase.

The course is planned to achieve these objectives through the different problems submitted in this block book and tutorials augmented by laboratory skills and clinical skills tutorials in addition to student interactions with the subject specialists. The students will visit health Centres and get acquainted with the health care delivery system with reference to antenatal care, pediatric care, immunization, and care of older people.

Title	Code	Semester/Duration	Credits
MAN AND HIS ENVIRONMENT	ME-ENV-127	2/Block 3 weeks	4

This is a 4-week (4 CHs) block on the inter-relation between Man's internal and external environments to include: (1) basic concepts of internal physiologic activities, (2) body fluids, (3) acid-base balance, (4) biological membrane, (5) body systems (respiratory, gastrointestinal, nervous etc..) exposed to environment, (6) impact of environment on health, (7) health consequences of exposure to potential environmental hazards (physical, chemical and biological), (8) multi-disciplinary approach to environment, (9) the role of the international organizations interested in environmental protection, (10) principles of epidemiology, (11) biological spectrum of environmental diseases, endemic and epidemic.

Title	Code	Semester/Duration	Credits
PROFESSIONAL CLINICAL SKILLS	ME-SKIL-211+221 +311+321	3,4,5 &6/ Longitudinal	8 (2 each semester)

This is a two-hour weekly session during semesters 3, 4, 5 and 6 to include: (1) communication skills of speaking, hearing, listening, recognizing strengths and weaknesses of close-ended and open-ended questions, non-verbal communications, establishing rapport, interview and be interviewed, dealing with a difficult patient, (2) taking history and perform examination of respiratory and cardiovascular systems, specifically taking respiration rate, temperature, locate

palpable arteries, and accurately take pulse, blood pressure, (4) take venous blood and recognize normal blood cells, basic blood tests, safety measure in blood taking, administering IV fluids, (5) prepare sputum for detection of mycobacteria, (6) interpret a normal PA chest x-ray, and recognize pneumonia, tuberculosis, and lung mass (7) interpret a normal ECG and that of myocardial infarction, (8) basic life support skills.

Title	Code	Semester/Duration	Credits
BEHAVIOURAL SCIENCE	BEHAV-119	2 / Block 2 weeks	2

A two-week block during Semester 2, to include: (1) introduction to basics of behavioural science and sociology,

(2) introduction to psychology, psychoanalysis and defense mechanism manifesting as behaviours, (3) role of stress in the etiology of physical and psychological illness, (4) coping with loss, grief and death, (5) genetic, developmental and environmental basis of behaviour ((6) cultural considerations in medical practice, (7) family structure and dynamics in health care, (8) health and illness behaviour, (9) personality.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF DISEASE-I	ME-DIS-212A	weeks 3 / 2	2

This is a three-week block on general microbiology to include: (1)revision of general histology, (2) morphology, classification, staining techniques and reactions, and pathogenicity of bacteria, viruses and fungi, (3) sterilization and disinfection, (4) basic concepts in immunity, (5)revision principles of inheritance, introduction to molecular biology, and genetic defects underlying inherited disorders, (6) mechanism of disease production (pathogenesis) including hypersensitivity and autoimmune etiology, (7) host defense mechanisms barriers and those provided by bacterial flora, (8) bacterial growth cycle and ability to grow on artificial media (solid and liquid) making smears, inoculation, recognition of bacterial colonies and recognition of media, and (8) anti-microbial.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF DISEASE-II	ME-DIS-212B	weeks 3 / 3	3

This is a three-week block on general pathology to include: (1) revision of general histology, (2) general pathology: inflammation, tissue damage and repair, neoplasia and abnormal cell growth, and inherited disorders.

Title	Code	Semester/Duration	Credits
BLOOD, AND LYMPH	ME-HEMAT-316	3/3 weeks	3

This is a three-week block module that introduces: (1) hemopoiesis, (2) normochromic and hypochromic anemias and iron overload, (3) megaloblastic anemia and other macrocytic anemias, (4) hemolytic anemias, (5) genetic disorders of hemoglobin, (6) the white cells, (7) the

spleen, (8) hematologic malignancies: (a) acute leukemias, (b) chronic myeloid leukemia, (c) chronic lymphoid leukemia, (d) myelodysplasia, (e) Hodgkin's and non-Hodgkin's lymphomas, (f) multiple myeloma, (g) myeloproliferative disorders, (9) aplastic anemia and bone marrow failure, (10) platelets, blood coagulation and hemostasis, (11) Bleeding disorders, (12) coagulation disorders, (13) thrombosis and anti-thrombotic therapy, (14) blood transfusion, and pregnancy and neonatal hematololgy.

Title	Code	Semester/Duration	Credits
IMMUNOLOGY	ME-IMM-216	3 / 2 weeks	2

This is a two-week block module that introduces: (1) basic aspects, normal structure and function of the immune system, (2) mechanism of immune disorders, (3) differences between "innate" and "adaptive" immunity, (4) the roles of lymphocytes, macrophages, dendritic and NK celss, (5) the terminology and roles of cytokines, (6) various types of hypersensitivity reactions, (7) common features of autoimmune diseases including etiology, pathogenesis, morphology and clinical expression of systemic lupus erythromatosus, rheumatoid arthritis,, Sjogren's disease, mixed sclerosis (scleroderma), mixed connective tissue disease. And poly (aka, peri-) arteritis nodosa, (8) differences between primary (genetic) and secondary (acquired) immune deficiencies, (9) morphology, etiology, pathogenesis and clinical expression, and (10) concept, aim and protocols of vaccination.

Title	Code	Semester/Duration	Credits
CARDIOVASCULAR SYSTEM	ME-CVS-214	weeks 3/6	5

This is a six-week block module on the structure, functions and disorders of the heart and blood vessels. It includes: (1) morphology of the heart, (2) its blood supply, (3) various peripheral blood vessels, (4) structure of cardiac muscle, contraction of cardiac muscle, (5) electrical activity of the heart and normal ECG tracing, (6) cardiac cycle and cardiac output, (7) blood pressure regulation, (8) hypertension, (9) coronary arteries and ischemic heart disease, (10) rheumatic fever and valvular heart disease, (11) heart failure, (12) cardiomyopathies, and (13) essential drugs used in cardiovascular disease.

Title	Code	Semester/Duration	Credits
RESPIRATORY SYSTEM	ME-RES-213	3/5 weeks	5

This is a five-week block module, to include: (1) describing the anatomy of the thoracic cage, muscles, diaphragm, upper and lower respiratory tract (including nasal cavity, larynx, trachea, bronchial tree, lungs, pleura), mediastinum, mechanism of respiration, (2) physiological and biochemical bases of normal lung functions and volumes, gas exchange in lung and tissues, gas transfer, (3) pathological and microbiological aspects in airway disease, respiratory pathogens, respiratory infections, (4) skills of taking history and performing physical examination to elicit physical signs, prepare a list of differential diagnosis and suggest suitable investigations, (5) given one of the following problems/conditions: pneumonia, foreign body inhalation, bron-

chial asthma, pleural effusion, pneumothorax, tuberculosis, mediastinal masses, ca bronchus. The student will be able to use basic and clinical sciences to outline diagnostic criteria and management, and show impact on family and community, (6) role of inherited, environmental and occupational factors in respiratory disease.

Title	Code	Semester/Duration	Credits
COMMUNITY MEDICINE PUBLIC HEALTH 1 (PRIMARY HEALTH CARE, 2 (BASIC EPIDEMIOLOGY), AND 3 (EPIDEMIOLOGY OF ENDEMIC DISEASES)	ME-PHC-215, M-EPI- 312 and ME-EPI-322	4,, 5 and 6/ Block or Longitudinal	3+2+2 (TOTAL 7)

This is a series of 3 longitudinal block module during Semesters 4, 5, and 6. They may be taken in block modules. They consist of: (1) theoretical studies on health system research, (2) the socioeconomic, psychological, behavioural and environmental factors related to health, epidemiology of disease and its effects on management, (3) primary health care, (4) weekly community visits to health centres and villages trying to: (a) understand the health problems, (b) help the local people and authorities in suggestions and (c) involvement in solving them.

This is possible through the study of (1) epidemiology, the methods used in community medicine to investigate epidemics, (2) maternal and child health, (3) health delivery system research and (4) control of endemic and communicable diseases.

The longitudinal modules are called ME-PHC-215 (2nd Year), ME-EPI -312 and ME-EPI- 322 (3rd Year). The division of the curricular content of the community modules is based on the activities conducted in the field and the research project identified by the students..The course is based on theoretical sessions in the College and practical training in the PHC Centres.

The purpose of this undergraduate curriculum in community medicine is to expose the students to the health problems of the community in order to understand the principles of care of defined populations, based on costeffective and scientifically sound methods. The curriculum aims at producing doctors who can understand health in socio-psychological and economic milieu and devise a holistic approach towards care of the individuals, families and communities. The curricular approach also imparts hands-on training for conducting operational and other research as well as critically appraising scientific literature to keep updated.

The course is essential for the students to understand health and its determinants together with the factors responsible for disease. This course is offered to facilitate students to acquire the knowledge and skills for providing basic promotive, preventive and curative care at the primary and secondary levels. The students would understand the basic concepts of epidemiology to apply it in understanding health statistics, investigating epidemics and designing small research projects. They will be able to apply these concepts in understanding and evaluating medical literature.

The courses also cover the essential elements of reproductive health that is practiced in the PHC set-ups creating a broad understanding of issues of reproductive health, and safe motherhood

and adolescent health. Inappropriate handling at this critical stage of development may lead to serious consequences ranging from deviant behaviour to indulgence in criminal activities.

The course content would strengthen the knowledge base for research. The basic concepts of analytic epidemiology are required for answering research questions. Applied biostatistics is essential for analyzing and interpreting data obtained in the research project. In addition, the courses touch on occupational health problems and provide orientation to hazards at work places and environment. They understand and manage problems in the care of old people. These aspects are consolidated in other courses.

❖❖ The following courses are proposed as replacement and reorganization of the community medicine courses. They are still awaiting approval by the scientific council. Their details are as follows:

Title	Code	Semester/Duration	Credits
EPIDEMIOLOGY	ME-EPID-312	4/2 weeks	2

This two- week block in semester 4 includes :(1) basics of epidemiology (2) theoretical studies on health system research, (3) the socioeconomic, psychological, behavioural and environmental factors related to health, and epidemiology of disease (4) determinants of health,(8) the concept of screening and its role in health promotion and disease prevention,(9)demographic characteristics of Sudan, (10) and the application of epidemiology in disease process with respect to person, place and time.

Title	Code	Semester/Duration	Credits
PRIMARY HEALTH CARE	ME-PHC-322	weeks 4/3	3

This 3-week block in semester 4 consists of theoretical studies on health system, the socioeconomic, psychological, behavioural and environmental factors related to primary health care. This course is devoted to expose students to health Centres and rural areas to identify the local health problems and help the local people and authorities in solving them. This is made possible through health research and community medicine studies to investigate problems like child and maternal health, and control of endemic and communicable diseases. The course touches on occupational health and environmental hazards.

Title	Code	Semester/Duration	Credits
RESEARCH METHODOLOGY	ME-SEARCH-227	weeks 5/2	2

This is a two-week module in which the student learn the basics of research including: (1) selection of an appropriate research problem, based on priorities, (2) evaluation of a research article, (3) the steps in conducting research, (4) searching the literature, (5) developing hypothesis, (6) identification of research population and sample size, (7) obtaining consent, (8) data collection, (9) data analysis, (10) interpretation of findings, (11) presentation and defending re-

sults, discussion, conclusions and summary(12) observing all ethical issues in every step of research. By the end of this course, students are expected to write their own research proposals.

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT	ME-EPID-215	5/3 weeks longitl	3

This 3- week block in semester 5 follows the epidemiology and research methodology courses. Students are expected to start the course by revision and finalization of their research proposals, the result of work done in the research methodology course. In this course, students are expected to: participate in organized community visits to health centres and villages to: (a) identify the local health problems, (b) and help the local people and authorities in finding solutions. Students are expected to apply the theoretical knowledge in research methodology to design their study, decide on the sample, collect and analyze the data. Expert supervisors will have regular meetings with the students groups over semester5, 6, and 7, to monitor the research process. Each group would submit a written thesis and dates for presentations would be specified.

❖❖ Epidemiology of communicable and non communicable diseases will be covered as an integral part of each course in phase 2 of the curriculum.

Title	Code	Semester/Duration	Credits
MUSCULOSKLETAL SYSTEM	ME-MSK-223	4/5 weeks	3

This is a five-week block module, on: (1) the structural and functional details of bones, muscles, nerves and joints, (2) physiology of excitable tissues, (3) processes of muscle contraction, (4) disruption in continuity of bone and methods of restoration of bone function, (5) complications of bone fractures, (6) calcium metabolism, (7) bone infections, (8) inflammation and degeneration in joints, (9) bone and muscle tumors, (10) living and imaging anatomy of bony landmarks of musculoskeletal system, (11) examination skills of musculoskeletal system, (12) musculoskeletal pain, and (13) essential drugs used in musculoskeletal disorders, road traffic accidents and their impact on individual, family and community (outline).

Title	Code	Semester/Duration	Credits
NUTRITION AND METABOLISM	ME-NUT-224	4/4weeks	4

This is a four-week block module that helps students understand the: (1) biochemical and physiological basis of nutrition, (2) food substances and supplements including vitamins, (3) breast feeding, (4) nutritional requirements, (5) nutritional disorders in infancy and childhood including malnutrition, (6) deficiency of vitamins and certain other substances resulting in disease,(7) diagnosis and management of nutritional disorders, diabetes mellitus and hyperlipidemias, with particular reference to those occurring in the Sudan.

Title	Code	Semester/Duration	Credits
GASTROINTESTINAL SYSTEM AND ORAL HEALTH	ME-GIT-225	4/6weeks	6

This is a six-week block module, on the structural details of (1) the anatomy of anterior abdominal wall, inguinal region, scrotum, testes, abdominal cavity, gastrointestinal tract, associated organs (liver, biliary tract, pancreas, and spleen including innervation, (2) functional aspects of mastication, deglutition, digestion and absorption of food, mobility and homeostatic role of the hepatobiliary system and GI tract, (3) gastrointestinal symptoms of nausea, vomiting, diarrhea, constipation, abdominal pain, distension, etc, (4) common diseases like peptic ulcer, jaundice, infections and infestations, neoplasms and their definite or possible etiology, pathogenesis, and clinical features (5) common investigative procedures applied in GIT (e.g. stools and blood examination, ultrasonography, radiology, endoscopy), (6) common operative procedures, and (7) essential drugs used in GIT problems.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICAL ETHICS	ME-ETHIC-226	2/Longitl	2

This is a two-credit-hour course by the end of which the student should show an understanding of the (1) history of medicine, (2) the role of the Moslem scholars in the practice of medicine, research and medical ethics, (3) the milestones of medical education in the Islamic era, (4) the Fiqh of illness and the sick, the religious regulations concerning treating the sick person, how does the sick person performs his rituals: cleanliness, prayers, fasting, pilgrimage? Also, (5) the visiting of sick person, (6) managing a death episode, (7) the religious conduct when males are managing female disease and vice versa, (8) the emerging controversies of in vitro fertilization, transplantation, brain death, cloning, genetic engineering. Students should be aware of the (9) Figh of health preservation including cleanliness, sleep, eating and drinking, the jurisprudence of toxic substances and narcotics, infectious diseases, breast feeding, consanguity marriage, quarantine, death and funerals, dissection of human body for teaching and law, (10) medical behaviour, professional ethics, responsibility of a health professional, (11) issues in protection of acts of a health professional and (12) giving an expert witness at court. It will include the internationally-agreed upon- ethics as well as the evolution of medical ethics in pre-Christian, Christian and Islamic eras.

Title	Code	Semester/Duration	Credits
URINARY SYSTEM	ME-URO-313	5/5 weeks	5

This is a five-week block module, on the structural details of (1) the anatomy of the kidney, ureters, urinary bladder and urethra, and the adjacent posterior abdominal wall and related genital organs, (2) functional aspects of the kidney in the production of urine, excretion of metabolic end products, regulation of blood pressure, body fluids osmolarity and acid base balance, (3)

urinary symptoms of renal (urinary) colic, hematuria, dysuria, etc, (4) common diseases like of urinary calculi, renal failure, urine retention, neoplasms and their definite or possible etiology, pathogenesis, clinical features (5) common investigations and procedures applied in urinary tract problems (e.g. urine and blood examination, ultrasonography, radiology, cystoscopy etc..), (6) common operative procedures, and (7) essential drugs used.

Title	Code	Semester/Duration	Credits
REPRODUCTIVE SYSTEM	ME-REP-314	5/4 weeks	4

This is a four-week block module, on the structural details of (1) the anatomy of the male and female reproductive systems (including embryogenesis and fetal growth and mammary gland), and the adjacent posterior and anterior abdominal and pelvic walls, and related urinary organs, (2) functional aspects of the reproductive systems (e.g. menstrual cycle, physiology of pregnancy and lactation, puberty and age-related changes, and hypo- and hyper secretion of male and female gonads, (3) reproductive problems including infertility, bleeding in early or late pregnancy, abnormal and complicated pregnancy, normal and abnormal labor etc, (4) community aspects of reproduction, antenatal care, assisted pregnancy, family health, (5) common investigations and procedures applied in reproductive problems (e.g. urine and blood examination, ultrasonography, etc..), (6) common operative procedures, and (7) essential drugs used.

Title	Code	Semester/Duration	Credits
ENDOCRINE SYSTEM	ME-ENDO-315	5/4 weeks	4

This 4-week bock module is concerned with endocrine glands and metabolism and their problems. It consists of objectives of basic sciences integrated with clinical sciences and skills. It covers: (1) the anatomy, histology, development and secretions of these glands, (2) their functions, diseases occurring as a result of reduced or increased production,(3) diagnostic tests and (4) management. The course includes: (5) related normal metabolic functions, (6) the abnormalities causing diseases like diabetes mellitus, (7) their diagnosis, management and prevention at individual and community levels.

Title	Code	Semester/Duration	Credits
HEAD AND NECK	ME-HAN-322	6/3 weeks	2

This is a three-week-block on the: anatomy of the head and neck. The student should: (1) identify the various parts of the skull bones, particularly the cranial cavity and facial skeleton, including all sutures and foramina, indicating the structures passing through them, (2) name and locate muscles; their attachments, nerve supply and action, on the skull bones, particularly the muscles of mastication and facial expression, (3) describe the walls, fissures, foramina, notches, and name and identify its contents, particularly the extraocular muscles and nerves, (4) Identify the various parts of the eyeball, and discuss the development, structure and function of each, (5) describe the morphology and structure of the various parts of the nasal cavity

and their functions, including the paranasal sinuses (6) review the anatomy and histology of the oral cavity, including the salivary glands (7) describe the triangles of the neck and their contents, particularly lymph nodes and thyroid and parathyroid glands, (8) describe the skeleton and soft tissues of the larynx, its extrinsic and intrinsic muscles and their nerve supply and actions, (9) review the parts of the pharynx, its muscles and nerve supply, and (10) the various parts of the ear and their functions.

Title	Code	Semester/Duration	Credits
NERVOUS SYSTEM AND SPECIAL SENSES	ME-CNS-324	weeks 6/8	8

This is a 8-weeks course that covers the basic and clinical sciences of the nervous system including the special senses, all integrated with the necessary skills, around common problems. The content detailed in the comprehensive objectives includes: (1) structure of the nervous system and its components, (2) functions of the nervous system components and special senses, (3) common pathological deviations that affect the functions of the nervous system components and consequences of these changes, (4) underlying pathophysiological basis of common neurological and special sense disorders, (5) approach to neurological and special sense problems in a logical sequence, (6) taking appropriate history from, and conduct systematic physical examination on patients with nervous system complaints, (7) performing and requesting tests and investigations necessary in diagnosis of common disorders of the nervous system, (8) Outline clinical management plans for common neurological and special sense disorders, (9) identifying the psychological, social and economic impacts of some common neurological disorders in the community, (10) drugs used in the management of common neurological disorders and (11) rehabilitation of patients with neurological disorders, as individuals and in the community.

Title	Code	Semester/Duration	Credits
TROPICAL MEDICINE	ME-TROP-324	weeks 6/2	2

This is a two-week course meant to highlight the importance of tropical diseases in Sudan and worldwide. In Sudan a patient may have more than one tropical disease or tropical and non-tropical at the same time. This course will be studied in form of problems of common presentations of tropical diseases. By the end of this course the student should be able to diagnose, manage and take appropriate preventive measures; (10 in the relations between vectors and hosts, (2) causes of fever in the tropics, (3) malaria, (4) schistosomiasis, (5) leishmaniasis, (6) leprosy, (7) brucellosis and enteric fever, (8) amaebiasis and giardiasis, (9) meningitis, (10) trypanosomiasis, (11) onchocerciasis, (12) snake bites and scorpion stings.

In spite of advances in all modalities of investigation, history taking and clinical examination are the sines-qua non in medical practice. Failure to master both would lead to waste in investigation cost and patients suffering. The course would enable the student to show: (1) full awareness of

importance of history taking and examination, (2) take a comprehensive history from the patient, relatives or others, (3) analyze the history to reach the possible diagnoses or final diagnosis, (4) perform full physical examination to limit the above possibilities and reach a short list of differential diagnoses, (5) request intelligent cost-effective investigations for final diagnosis.

Methods of teaching in this course will include the use of healthy volunteers, skill laboratory and case presentations for demonstration of clinical symptoms and signs.

Title	Code	Semester/Duration	Credits
BASIC PHARMACOLOGY & THERAPEUTICS	ME-PHARM-324	6/4 weeks	4

A four-week block module during semester 6, to include: (1) definition of a drug, (2) development of a drug, (3) drug absorption and pharmaco-dynamics and kinetics, (4) rational use of drugs in the management of emergency and common problems, including drug prescription for common diseases: rhinitis, sinusitis, laryngitis, bronchitis, pneumonia, pulmonary TB, (5) interaction between drugs and of genes with drugs for example glucose-6 phosphate dehydrogenase deficiency and sulphonamides and antimalarials, (6) clarify interrelationship between bacterial infections, inflammatory mediators, anti-inflammatory drugs and antimicrobial drugs, (7) effects of morphine, (8) clinical uses and side effects of aspirin, paracetamol, and non-steroidal anti-inflammatory drugs, (9) outline the use and side effects of levodopa (in parkinson's disease), tricyclic antidepressants (in depression), benzodiazepines (in insomnia), antipsychotic drugs (in schizophrenia), antiepileptics (in seizures), muscarine antagonists, anticholinestrases, sympathomimetics and beta blockers, study of anti-hypertension, anti-diabetic and lipid-lowering drugs.

Phase 3: = Semesters 710-, Clerkships

General organization of the clerkships

The General Objectives of the clerkships are as follows: The students would be able to:

1. Show responsible and compassionate behaviour with the patient and family considering the cultural, social and economic background, and in dealing with all levels of education and abilities.
2. Master the required communication skills for appropriate history taking and medical examination.
3. Appreciate the role of perfect understanding of basic sciences (anatomy, physiology, and biochemistry) and the underlying pathophysiological processes relevant to medical practice in diagnosis and management of common illnesses in patient and community.
4. Be acquainted with the epidemiological profile of the population and society, their heritage and cultural, social, geographic and economic characteristics, and relationship of all those to medical (surgical, obstetrical, gynecological, pediatric) disease etiology and management.

5. Have the knowledge and skills necessary to identify and manage the health problems of a patient: emergency situations, common endemic or epidemic diseases, injuries and disabilities, including health promotion, prevention, treatment, rehabilitation and follow up.
6. Opt for the wise selection of the most appropriate and cost-effective investigations to reach the proper diagnosis, considering the patient rights and abilities and the capabilities of the health system.
7. Interact effectively with the health team (and appreciate the role of others) in providing medical services.
8. Continue independent learning and pursue postgraduate studies

IMPORTANT:

Detailed specific objectives can be seen in the Medical Curriculum Manual. A clerkship booklet is provided to students in the first session in the clerkship. It is the students' responsibility to work towards achieving the objectives included, irrespective of the educational activities offered during the block. The objectives represent the minimum required competences for these clerkships.

Title	Code	Semester/Duration	Credits
INTERNAL MEDICINE	ME-MED-411	7,8,9, or 10/ 14 weeks	12

This is a 14-week continuous block, which is interrupted by longitudinal courses for one half-day every week. During this clerkship, the student should: (1) demonstrate good attitudes, ethics and professional behaviour in the practice of internal medicine (2) obtain full history relevant to the medical problem in general practice, perform appropriate physical examination, requests informative and cost-effective investigations, analyses information to reach (or suggest differential) diagnosis, select (or suggest) proper treatment, health promotion, prevention, protection, follow up and rehabilitation, including problems seen in emergency situations, epidemic and endemic diseases, common respiratory, cardiovascular, gastrointestinal, renal, endocrine, rheumatic, and nervous system problems, (3) demonstrate knowledge of basic and clinical sciences, relevant to internal medicine and general practice, (4) recognize urgent and emergency medical conditions (see also ERM-407, (5) analyze community problems related to medical disease, and (6) describe essential drugs used in common medical problems (headache/migraine and various types of pains and colics, seizures, meningitis/encephalitis, malaria, typhoid fever, schistosomiasis, leishmaniasis, hypertension, stroke, dementia, disorders of the motor systems. coronary heart disease, congestive heart failure, arrythmias, pneumonia, asthma, causes of dyspepsia, nephritis and renal failure, diabetes, worm infestations, vomiting diarrhoea, constipation, dehydration, nutritional deficiencies, anemias, hematological malignancy, bleeding disorders, thyroid disease, obesity, adrenal insufficiency, Cushing syndrome, osteoarthritis, rheumatoid

Title	Code	Semester/Duration	Credits
EMERGENCY MEDICINE	ME-MER-412	7,8,9 or 10/4 weeks	4

A four-week block during medical clerkship semester designed to contain common medical emergencies seen in Emergency Department, mostly undifferentiated cases, that require

life-saving management including: (1) prioritization, (2) resuscitation and stabilization, (3) simultaneous management of more than one patient, (4) appropriately-focused history and physical examination, (5) working differential diagnosis (6) quick investigations, (7) courageous attitude, (8) adequate basic clinical skills, (9) organization skills and documentation habits, (10) recognition of importance of pre-hospital or onsite emergency care, (11) psychological care, ethical issues in emergency. Major emergency conditions include: (1) trauma resuscitation, (2) poisoning, (3) cardiac dysrythmias, (4) myocardial infarction, (5) epilepsy and seizures, (6) coma, (7) status asthmaticus, (8) urine retention, and (9) acute abdomen. The essential skills are: (1) basic life support (BLS), (2) advanced cardiac life support (ACLS), (3) venepuncture, (4) intravenous lines, (5) arterial puncture, (6) local anesthetic infiltration, (7) urinary catheter insertion, (8) application of bandage, splints and casts, and (9) wound suturing.

Title	Code	Semester/Duration	Credits
DERMATOLOGY	ME-DERM-413	7,8,9, or 10/2 weeks	2

A two-week block, just after or in integration with internal medicine clerkship, to include: (1) description of the histological features of the skin, and explain the causes of variations in skin colour, texture and thickness, (2) outline of the basics of dermatologic terminology, (3) basic clinical skills to diagnose and suggest management for common skin problems.(4) health promotion, and protection, prevention, treatment, rehabilitation and followup of skin problems..(5) structure, function and pathophysiological processes of the following skin conditions:

a) acne and related disorders: acne, rosacea and perioral dermatitis, (b) eczema (endogenous and exogenous) and atopic and seborrheic dermatitis, (c) papulosquamous diseases: psoriasis, lichen planus, pityriasis rosea, (d) pigmentary disorders: vitiligo, melasma, (e) common skin infections: fruncle, carbuncle, impetigo, cellulites, dermatophytosis, candidiasis, viral wart, herpetic infections, molluscum, scabies, leishmaniasis, (f) bullous diseases: pemphigus, bullous pemphigoid, dermatitis herpetiformis, (g) connective tissue diseases: lupus, dermatomyositis, scleroderma, (h) drug reactions, (i) common skin infections, eg. Chickenpox, herpes zoster, measles, German measles etc.., (j) skin cancer eg. Basal and epithelial cell carcinomas.

Title	Code	Semester/Duration	Credits
GENERAL SURGERY (incl. anesthesia)	ME-SURG-421	7,8,9 or 10/12 weeks	12

A twelve-week continuous block, interrupted only by longitudinal courses for one half-day every week, to include: (1) demonstrating good attitudes, ethics and professional behaviour in the practice of surgery (2) obtains full history relevant to the surgical problem, perform appropriate physical examination, requests informative and cost-effective investigations, analyzes information to reach (or suggest differential) diagnosis, select (or suggest) proper treatment, health promotion, prevention, protection, follow up and rehabilitation, including problems seen in emergency situations, (3) demonstrating knowledge of basic and clinical sciences, particularly anatomy, pathology, microbiology and basic skills, relevant to surgery, (4) recognize urgent and emergency surgical conditions, e.g. burns, acute abdomen, head injury, (see also MER-412, (5) diagnose and manage goitre and thyroid disorders, acute abdomen, breast lump,

inguino-scrotal swellings, lymphadenopathy, hematemsis, biliary and liver surgical conditions, peptic ulcer disease, anorectal disorders, urinary stones and masses, chest trauma, (6) outline diagnostic procedures and management of cardiac surgical problems, brain tumors, abdominal masses, (7) anesthetics for preoperative and during operation, (8) postoperative management, (9) basic operative skills, and (10) essential drugs used in general surgery.

Title	Code	Semester/Duration	Credits
ORTHOPEDIC SURGERY	ME-ORTOP-422	or 10/4 weeks 7,8,9	4

A four-week block, just after or in integration with the general surgery clerkship to include: (1) reviewing the gross anatomic features of the musculoskeletal system, bone development, identification of bony parts in x-rays, bone metabolism, and pathophysiological bases of common orthopedic problems, (2) taking adequate history of trauma and chronic orthopedic problems, performing proper physical examination, and request the appropriate and cost-effective investigations, (3) management of emergency and trauma in orthopedics (multiple injuries after road traffic accidents and other accidents, (4)principles of fracture management, (5) management of common and serious fractures, shoulder dislocation, pyogenic and chronic bone and joint infections, osteoarthritis, (6) diagnosis and outline of subsequent steps in the management of back pain and spinal injuries, (7) outline mechanical hip, knee and other joint disorders, a limping child, peripheral nerve injuries, congenital dislocation of hip, (8) identification of lytic or sclerotic bone lesions in an x-ray, (9) essential drugs used in orthopedic problems, (10) rehabilitation after orthopedic disease or fracture, and (11) neoplastic bone lesions..

Title	Code	Semester/Duration	Credits
OPHTHALMOLOGY	ME-OPTAL-423	7,8,9 or 10/2 weeks	2

A two-week block, just after or in integration with the general surgery clerkship to include: (1) taking history, performing physical examination, carry out the visual acuity and refraction tests, and request the necessary investigation, (2) recognize the critical role of the primary care physician in preventing visual loss through prompt and appropriate treatment and timely referral, (3) manage ocular emergencies and trauma, (4) recognize, diagnose and outline subsequent steps in management of the common ocular conditions: red eye, impaired vision, painful eye, cataract, glaucoma, exophthalmos, retinopathy or eye manifestations of systemic disease, abnormal ocular mobility, (5) the use of the ophthalmoscope, and (6) essential drugs used in ophthalmology.

Title	Code	Semester/Duration	Credits
EAR, NOSE AND THROAT	ME-ENT-424	7,8,9 or 10/2 weeks	2

A two-week block, just after or in integration with the general surgery clerkship semester, addressing clinical activities in the ENT department, such as: (1) taking history and performing examination on ENT patients, (2) using knowledge of basic sciences, pathophysiological processes to explain disorders, (3) use clinical sciences and skills, and investigations to reach differential diagnosis, and (4) recommend or observe management done by senior members of

the ENT health team. Details of disorders include: (1) common cold, (2) sinusitis, (3) tonsillitis, (4) laryngitis, (5) otitis media, and (6) neoplasia, (7) recognize the various caused of hearing loss, and (8) carry out proper timely referral to specialist. The skills include: (a) examination of the mouth, (b) use of auroscope and laryngoscope in examination of the ear and larynx, and (c) recognize an audiology machine and interpret results.

Title	Code	Semester/Duration	Credits
RADIOLOGY AND IMAGING	ME-RAD-414	10/2	2

A two-week block in semester 10 or a longitudinal course during Semesters 7 and 8, to include: (1) the modalities and techniques used in imaging and outline of the basic physics underlying image production and quality control, (2) identification of the normal anatomic structures in routine radiographs of the chest, plain abdomen, pelvis, skull and various segments of the limbs, as well as identifiable structures seen in CT and MR cuts of the normal brain and mediastinum, (3) the techniques used in routine plain and contrast radiography of the various parts and systems of the body related to common and/or serious problems, (4) identification of the reliable diagnostic radiological signs seen in common respiratory problems (pneumonia, emphysema, bronchiectasis, pleural effusion, pneumothorax, ca bronchus), and in live-threatening emergency situations such as chest pain, acute abdominal pain, trauma/fractures, syncope/comma, bleeding, etc.., and (5) essential drugs and material used in radio- diagnosis and patient care while in the imaging department.

Title	Code	Semester/Duration	Credits
MEDICAL PROFESSIONALISM	ME-PROF- 415	10/ longitudinal	2

The medical profession deals with people in every minute possible aspect of their lives. Accordingly, the society expects medical doctors to provide a constant supply of the best care regardless of the possible difficulties. This block introduces the students to: (1) the concept of medical professionalism including medical ethics, communication skills and health advocacy. (2)values and attitudes expected from medical professionals.(3) the expected role of the doctor within the community.(4)The basics of doctor-patient relationship.(5) The effect of religion, culture and educational level on doctor-patient relation.(5)the relation between law and medicine. (6) addressing critical situations: breaking bad news, medical errors, conflict resolution and counseling.(7) and communication between health professionals.

In these two weeks the student should show full understanding of the above and commitment to it.

Title	Code	Semester/Duration	Credits
OBSTETRICS AND GYNECOLOGY	ME-OBGYN- 511	7,8,9 or 10/12 weeks	12

During the 12-week clerkship, the student would (1) demonstrate good attitudes, ethics and professional behaviour in the practice of obstetrics and gynecology (2) obtain full history relevant to obstetrics and gynecology practice, perform appropriate physical examination, requests informative and cost-effective investigations, analyze information to reach (or suggest) differential diagnosis, select (or suggest) proper treatment, health promotion, prevention, pro-

tection, follow up and rehabilitation, including problems seen in antenatal care, contraception, infertility, bleeding in early or late pregnancy, pregnancy complicated with systemic disease, high risk pregnancy, disorders of menstrual cycle, (3) demonstrate knowledge of basic and clinical sciences, relevant to obstetrics and gynecology, (4) recognize urgent and emergency conditions in obstetrics and gynecology (5) analyze community problems related to women health, (6)attend and discuss the progress of labor and monitoring, (7) discuss genital infections and tumors of the genital system eg. ovaries, uterus etc.., and (8) identify and discuss essential drugs used in obstetrics and gynecology problems.

Title	Code	Semester/Duration	Credits
PSYCHIATRY	ME-SYC-512	7,8,9 or 10/4 weeks	4

A four-week block, anytime during semester 9, preferably after ME-MED 411 and/or ME-SURG 421, to include: (1) demonstrating professional ethics and attitudes appropriate for psychiatric practice, (2) establishing a rapport with a variety of patients and families, and taking comprehensive history of a patient problem in an emphatic environment, being aware of patients emotional responses and family concerns on raising certain in-appropriate questions, (3) conducting physical examination of whole body and mental status including, cognitive testing and assessment of suicidal or homicidal risks, (4) requesting suitable, and cost-effective investigations, (5) being aware of the various relevant biological, psychological and social factors related to the etiology and management and rehabilitation of a psychiatric patient, (6) managing psychiatric emergencies (e.g. hostile or aggressive patient), depression, schizophrenia (7) recognizing, diagnosing (or outline necessary steps in diagnosis and management of) mood disorders (e.g. mania), anxiety (e.g panic, obsessive-compulsive, phobias), personality disorders, cognitive impairment and substance (chemical. alcohol, drug) abuse, (8) disorders like, dementia, delirium, psychoses, human sexuality problems, (9) essential drugs used in psychiatric practice.

Title	Code	Semester/Duration	Credits
FAMILY MEDICINE	ME-FAM-513	7,8,9 or 10/3 weeks	3

This three-week block, can be implemented longitudinally, if need be. Ideally the student should be attached to a known family in the vicinity of the college early on in the curriculum (semesters 4-6), the last four week consolidate his/her activity during the attachment. Alternatively the following components should be covered: basic interviewing, communication skills and examination skills, genetic counseling, nutritional counseling, approach to management of headache, backache, dyspepsia, a febrile child, vaccination, bronchial asthma, hypertension, diabetes mellitus, sore throat, iron deficiency anemia, irritable bowel syndrome, intestinal worms, otitis media, depression, anxiety and other psychiatric problems, obesity, smoking habit, snuff taking, alcoholism, drug addiction, ischemic heart disease, arthritis.

Title	Code	Semester/Duration	Credits
PAEDIATRICS	ME-PED-521	7,8,9 or 10/11 weeks	11

A 11-week continuous block, some of the contents are also relevant to ME0FAM-509, to include:

(1) professional ethics and attitudes appropriate for pediatric practice, (2) review of the developmental anatomy and disorders encountered at birth and following childhood years, (3) taking a comprehensive pediatric history form child/ adolescent or their immediate care giver, perform and record proper physical examinations, and select the most appropriate and cost effective investigations relevant to the child problem, (4) recognition and management of emergency pediatric conditions (convulsions, fever, dehydration, respiratory distress, etc..), common neonatal problems, child nutritional problems, (5) recognizing, diagnosing (or carry necessary steps in diagnosis), and outline subsequent steps in the management of nephritic syndrome, nephritis, renal failure, obstructive uropathy, type 1 diabetes mellitus and other endocrine disorders in childhood, congenital and acquired heart disease, childhood malignancies (6) analyzing community problems related to child health, immunization and disorders of immunity, (7) accidental and suicidal poisoning in children and (8) essential drugs used in pediatric practice.

Title	Code	Semester/Duration	Credits
FORENSIC MEDICINE AND LAW	ME-LAW-522	7,8,9 or 10/2weeks	2

A two-hour every two weeks during Semesters 9 and 10, or a two-week block, to include: (1) recognition of death and identify age and race of a dead person, and identification of cause of death (gunshot, physical agents, electric contact, burns, asphyxia, drowning etc) (2) description of postmortem changes, and determination of the time of death, (3) examination of specimens and stains (caused by) blood, semen, milk, excreta etc, (4) definition and classification of wounds from the medico-legal aspects, (5) recognition of types of head injuries and factors affecting them, (6) identification of firearms and firearm injuries, (5) recognition of injuries due to physical agents, (7) recognition of sexual assaults on both sexes, rape and consequences of abortion and miscarriages, (8) identification common types of toxins, poisons and poisoning, and determination of the environmental and criminal causes of common poisoning incidents, (9) giving witness in a court, (10) writing a death certificate, (11) taking proper history from attendants, performing physical examination and requesting appropriate investigations to reach the cause of death.

Title	Code	Semester/Duration	Credits
Health economics and hospital management	ME-HM-523	10/2weeks	2

A two-week block introducing students to: (1) the definition and scope of the terms" health economics", "health value", " market equilibrium",(2) the economic factors which influence health,(3) demand for and supply of health care,(4) planning, budgeting and monitoring mechanisms,(5) assurance that informatics solutions in healthcare meet patient's privacy, confidentiality, and security requirement,(6) health informatics as a decision support in management,(7) leadership- doctors as leaders or managers,(8) Sudanese health system,(9) legal responsibilities for health care management,(10)documentation,(11) communication,(12) evidence-based practice,(13) sources of conflict and conflict resolution at work.

FACULTY OF

CLINICAL & INDUSTRIAL PHARMACY

UNDERGRADUATE & GRADUATE PROSPECTUS

VISION AND MISSION

The Faculty of Pharmacy- National University- Sudan strives towards developing the highest standards of academic professional excellence in clinical and industrial pharmacy. The various parts of this College aim to produce ethically responsible, innovative, critically thinking professional pharmacists committed to meeting the health and developmental needs of all communities in the Sudan and the rest of the world, appropriately and efficiently. The programmed teach the students how to learn and continue as lifelong learners in pharmacy. The College aims to be the most respected educational institution of pharmacy, as evidenced by high quality of premises, up-to-date administration and governance, job- and research-directed instruction, quality of graduate and their ethical, professional and scholarly contribution.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Clinical and Industrial Pharmacy, has to:

1 - Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International students may have % less in the School Certificate scores.

3 - Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Pharmacy.

4 - Pay the published fees: 65,000 SDG or US $ 6,400 [international students] for the academic year 2018-2019

CAREER ADVICE

Students qualified with this Bachelor degree pass through a track decreed by the Sudan Medical Council and are so temporarily accredited as pharmacists. After working for a period specified by the Ministry of Health in each specialty/discipline, students acquire a license of per-

manent registration with the Sudan Medical Council and may work in pharmacies or hospitals administrative pharmacist, clinical pharmacist or work in the industry. Pharmacy grads may pursue master's and doctoral

CAREER ADVICE

Students qualified with the Bachelor degree pass through a track decreed by the Sudan Medical Council and temporarily accredited as pharmacists. A productiondegrees in many disciplines of Pharmacy to qualify for university teaching or to work in medication, reagents or dyes factories. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence

The objectives of the National University- Faculty of Pharmacy are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National University philosophy and message.
2. Graduate a practitioner with a Bachelor of Pharmacy (B Pham), with strong community orientation and ethical components, in both the clinical and industrial aspects. Attempts will start with the accreditation authorities to introduce the Pharm. D option.
3. Contribute to community development through health services provided in its own health institutions and other institutions including pharmaceutical industries, co-operating with them, through the following: (a) partnership in designing health programmes and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) Contribution in continuous education through short and long term courses, to improve efficiency of health workers and for the professionals to learn from each other for better mutual understanding and services, and (c) Provision of essential and appropriate equipments and supplies to improve quality of services, through partnership with the Ministry of Health, and Industry.
4. Strengthen pharmacy research, making use of the University's accessibility and communication privileges.

A graduate of the Faculty of Clinical & Industrial pharmacy should be able to

1. Adopt the strategies of the National University-Sudan and abide by its objectives and rules stated in its constitution and directives [the Student Guide].
2. Observe in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Medical Council), and maintain good and honest relations with his/her patients, their families, his/her colleagues across all sectors involved in health.
3. Assist in the diagnosis and management of cases related to drug side effects, dependence or deprivation, and other health problems prevalent at the level of the individual, family or society, with special emphasis on the nutritional and environmental problems common in

developing countries, and plays an active role in health promotion.

4. Integrate basic pharmacy, community and clinical training, and industrial situation in solving community, family and individual health problems.
5. Use scientific knowledge in diagnosis and management of the relevant health problems, according to known methods of problem solving and integration, and explains the scientific structural (anatomical), functional (physiological, biochemical), morbid (microbiological, pathological), and therapeutic (pharmacological) background related to the problems.
6. Manage emergencies relevant to drug intake, and decide and act properly on cases needing referrals to specialized centres or personnel.
7. Accepts to work in all settings according to needs, and act to improve health service delivery systems both quantitatively and qualitatively.
8. Encourage community participation and act in recruiting various sectors in defining drug and health-related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices.
9. Adhere to "health team" approach, acting as an efficient member, capable of its leadership sometimes, dividing labor and responsibilities among its members, and ensuring both effectiveness and homogeneity among the members [in courses on education, communication, community practice and clerkships]
10. Administer a pharmacy "unit" or "centre", or a pharmaceutical firm efficiently according to scientific, medical, statistical, economic and legal bases.
11. Continue to consider elements of efficiency, costing and economic implications in his/her therapeutic choices and advices.
12. Acquire the skills of teaching, learning and communication efficiently to carry out his/her duties in health education and in winning the confidence of patients and their families and societies.
13. Acquire the skills of self education, and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/her colleagues in the health team [in courses on education, computer, research methodology and report writing].
14. Carry health or health-related research on drug therapy or industry, alone or with other member(s) of the health team, using scientific methods known in such activities [in courses on education, research methodology, statistics, computer and report writing, medical ethics].
15. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career [in courses on computer, research methodology and report writing], and find out pharmacy information from the net.
16. Acquire postgraduate qualification in the discipline of his/her choice, recognizing the needs of

the society for certain specialties, particularly the general clinical pharmacist [in clerkships].

The learning strategies emphasize the following: (1) early acquisition of basic skills, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problem-oriented learning, (4) community-oriented and community-based activities, (5) integration of basic science, community and clinical pharmacy practice, and industrial pharmacy, in a multidisciplinary approach, (6) self- and peer education and evaluation, (7) team-work approach, (8) a wide range of electives, (9) continuous evaluation and (10) continuous education.

Feedback to students after mid-course and end of course assessment is an essential part of the pharmacy programme

The University adopts the following methods in the daily College of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions -once/ week at least (3) field practice in rural and primary health care settings and societies not less than 1/5th of the timetable, (4) practical sessions (laboratory, clinical, pharmaceutical industries) not less than 1/4th of the curriculum timetable, (5) skill laboratory (weekly) sessions, (6) lectures -not more than 1/3rd of the curriculum timetable (not more than 3 lectures/day). (7) educational assignments, reports and research activities (as many as the College would allow- at least one per module), (8) electives -not more than 10% of the curriculum timetable, and (9) graduation project.

Scope and Phases

The curriculum consists of biomedical sciences (anatomy, biochemistry, physiology, microbiology, pathology, pharmacology and statistics), pharmaceutical sciences (pharmaceutical mathematics, physical pharmacy, drug delivery and dosage forms, biopharmaceuticals and pharmacokinetics, biomedicinal chemistry and biotechnology), clinical and administrative sciences (pathophysiology, pharmacotherapy, drug information, management and pharmaco-epidemiology) and pharmacy practice (dispensing, jurisprudence, contemporary pharmacy practice, drug and society ethics). The emphasis in clinical pharmacy track is on pharmacotherapy.

The College is of five years' (10 semesters') duration divided into three phases, comprising about 220 CHs. A semester is 16 weeks in Phase 1 and 17-23 weeks in Phase 2, and 17-21 weeks in Phase 3. There are three compulsory Summer courses and three electives; credit hours of electives are included in the total.

Phase 1:Introductory courses and University requirements = Semester 1

Phase 2: Integrated basic pharmacy courses = Semesters 2-6

Phase 3: Clerkships in Industrial and Clinical Pharmacy = Semesters 7-8

Clerkships in Clinical and Industrial Pharmacy = Semesters 9-10

Timetable

Phase 1 (General requirements):

Semester 1 [26 CHs- 16 weeks]:

#	Title	Code	Weeks	Credits
1	Arabic language-1	ARAB-112	All semester weeks	2
2	Arabic language-2	ARAB-122	All semester weeks	2
3	Islamic studies -1	ISLAM-111	All semester weeks	2
4	Islamic studies-2	ISLAM-121	All semester weeks	2
5	Sudanese Studies -1	SUDAN-110	All semester weeks	2
6	Sudanese Studies -2	SUDAN-120	All semester weeks	2
7	English language-1	ENG-113	All semester weeks	2
8	English language-2	ENG-123	All semester weeks	2
9	Computer science-1	ME-COMP-116	All semester weeks	2
10	Computer science-2	ME-COMP-124	All semester weeks	2
11	Biostatistics	ME-STAT-117	All semester weeks	2
12	Introduction to medicine and medical education	ME-EDU-114	All semester weeks	2
13	Introduction to pharmacy Ethics	PH-ETHIC-226	All semester weeks	2

Examination of longitudinal courses (+re-sits) 2 weeks

Repeat courses or examinations for late comers and failures.

Phase 2 (Organ-system studies):

Semester 2 [19 CHs- 23 weeks]:

#	Title	Code	Weeks	Credits
1	Physics for pharmacy equipments and investigations	PH-PHYS-115	2	2
2	Behavioral science	ME-BEHAV-119	2	2
3	Basic biochemistry	ME-BIOC-118	4	2
4	Genetic and molecular biology	ME-CELL-119	2	2
5	Human body structure and function	PA-NAT-126	4	4
6	Principles of disease -1	ME-DIS-212-A	3	2
7	Organic chemistry for pharmacy -1	PA-ORG-127	3	3
8	Pharmacy orientation, Pharmaceutical calculations.	PA-CAL128	3	2

SUMMAR 1 AND ELECTIVES.

1. Pharmacy records and data collection (PA-SUM-131) 2 CHs
2. Medical genetics (E-131) 2CHs
3. Elective (E-132): A 1000 -word report on “Internet Sources of Pharmaceutical Sciences” 1CH
4. Repeat courses or examinations for late comers and failures.

Semester 3 [25 CHs- 20 weeks]:

#	Title	Code	Weeks	Credits
1	Professional skills-1 communication skills	PA-SKIL-211	All semester weeks	2
2	General and physical chemistry	PA-CHEM-217	All semester weeks	2
3	Human endocrine and metabolism	PA-METAB-214	5	5
4	Principles of disease -2	ME-DIS-212-B	3	3
5	Pharmacology -1	PA-PHARM-213	4	4
6	Pharmacognosy and plant sciences-1	PA-COG-215	5	5
7	Unit process	PA-UNPR-226	3	4

Examination of longitudinal courses (+re-sits) 2 week

Semester 4 [20 CHs- 17 weeks]:

#	Title	Code	Weeks	Credits
1	Professional skills-2 laboratory skills	PA-SKIL-221	All semester weeks	2
2	Pharmaceutical organic chemistry-2	PA-ORG-216	4	3
3	Pharmaceutical microbiology-1	PA-MIC-223	3	3
4	Pharmacology -2	PA-PHAR-222	4	4
5	Medicinal chemistry-1	PA-CHEM--225	3	4
6	Pharmacognosy and plant sciences -2	PA-COG-224	3	4

Examination of longitudinal courses (+re-sits) 1 week

SUMMAR 2 AND ELEVTIVE MODULES

1. Rural Residence for field work data for PA-SUMMER-227
2. Repeat courses or examinations for late comers and failures.

Semester 5 [22 CHs- 20 weeks]:

#	Title	Code	Weeks	Credits
1	Professional skills-3- laboratory skills-2	PA-SKIL-321	All semester weeks	2
2	Pharmaceutical analysis-1	PA-NAL-312	3	3
3	Pharmaceutical microbiology-2	PA-MIC-316	3	3
4	Physical pharmacy	PA-PH-317	4	4
5	Powder technology	PA-PWTEC-314	3	4
6	Pharmacy practice-1	PA-PRAC-313	4	3
7	Pharmaco-epidemiology & economics	PA-EPIC-327	3	3

Examination of longitudinal courses (+re-sits) 2 week

Repeat courses or examinations for late comers and failures.

Semester 6 [23 CHs- 17 weeks]:

#	Title	Code	Weeks	Credits
1	Professional skills-4- Drug supply management	PA-SKIL-311	All semester weeks	2
2	Introduction to Clinical pharmacy	PA-CLIN-322	All semester weeks	2
3	Pharmaceutical technology	PA-TEC-315	4	4
4	Dosage form design/QC	PA-DOS-326	3	3
5	Pharmacy practice-2	PA-PRAC-323	3	4
6	Basic therapeutics	PA-TREAT-325	4	4
7	Pharmaco-informatics	PA-INFO-324	3	4

Examination of longitudinal courses (+re-sits) 2 week

SUMMAR 3 AND ELECTIVES

1. Rural Hospital Residency (PA-SUM-331)2 CHs Block 2 weeks
2. Community pharmacies training and basic pharmacy skills
3. Repeat courses or examinations for late comers and failures.

Phase 3: Clerkship for industrial and clinical rotations

Semester 7 Industrial Pharmacy [24 CHs-20 weeks]

#	TITLE	CODE	DURATION [WEEKS]	CREDIT HOURS
1	Drug Abuse	PA-DAB-411	All semester weeks	2
2	Rational drug use	PA-RDU-427	All semester weeks	2
3	Drug design	PA-DRUG-421	5	5
4	Packaging technology	PA-PAC-424	2	2
5	Quality assurance in pharmacy	PA-QUAL-422	2	2
6	Quality assurance in industry	PA-QUAL-426	2	2
7	Pharmaceutical analysis -2	PA-NAL-423	5	5
8	Principles of marketing in pharmacy & pharmaceutical management	PA-MARK-414	2	2
9	Research methodology	PA-REC-429	2	2

Examination of longitudinal courses (+re-sits) 2 week

Semester 8 Clinical Pharmacy [19 CHs-17 weeks]

#	TITLE	CODE	DURATION [WEEKS]	CREDIT HOURS
1	Medical Ethics & Forensic pharmacy	ME-PAR-413	All semester weeks	2
2	Architectural design of drug factory	PA-FAC-425	3	3
3	Internal medicine	PA-MED-411	3	3
4	General surgery	PA-SURG-414	2	2
5	Emergency medicine	PA-MER-412	2	2
6	Chest and cardiology	PA-CVRS-413	2	2
7	Orthopedics	PA-ORTOP-415	2	2
8	Dermatology	PA-DERM-417	2	2
9	Ophthalmology	PA-OPTAL-416	1	1

Examination of longitudinal courses (+re-sits) 2 week

Experience aboard (PA-FOREIEN-E-429):

Elective course during mid-semester (or end of year) vacation period

Semester 9 Clinical Pharmacy [20 CHs - 21 weeks]

#	TITLE	CODE	DURATION [WEEKS]	CREDIT HOURS
1	Graduation project progress	PA-REC-532	All semester weeks	20
2	Psychiatry	PA-SYC-522	3	3
3	Pediatric	PA-PED-524	3	3
4	Ear, Nose and Throat	PA-ENT-517	3	3
5	Obstetrics & Gynecology	PA-OBGYN-521	3	3
6	Family medicine	PA-FAM-523	3	3
7	Pharmaceutical Biotechnology	PA-BIOTEC-526	3	2
8	College drug mini factory design	PA-COLLAB-529	2	3

Semester 10 Industrial Pharmacy [19 CHs-17 weeks]

#	TITLE	CODE	DURATION [WEEKS]	CREDIT HOURS
1	Medicinal chemistry-2	PA-CHEM-518	3	3
2	Drug stability & Shelf-life study	PA-STAB-527	3	4
3	Herbal and alternative medicine and photochemical screening	PA-HERB-528	3	3
4	Biopharmaceutics & Pharmacokinetics	PA-BIOCEU-525	3	3
5	Home drug storage	PA-DRUG-530	1	2
6	Graduation Project	PA-REC-531	4	4

CLERKSHIP EVALUATION is at the end of each clerkship= see ISO-9001 forms of College evaluation.

COURSE OUTLINE

Detailed behavioral objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included here.

Phase 1: Semesters 1, National Requirements Courses

Arabic language-2 (ARAB-122) - 2 CHs, longitudinal (See ARAB-112)

Islamic studies-2 (ISLAM-121) - 2 CHs longitudinal (See ISLAM-111)

Sudanese studies-2 (SUDAN-120)- 2 CHs, longitudinal (See SUDAN-110)

English language-2 (ENG-123)-2 CHs longitudinal (See ENG-113)

Title	Code	Semester/Duration	Credits
ARABIC LANGUAGE-1 and 2	ARAB-112+122	1 / Longitudinal	2

This is a National Requirement compulsory to all Arab Speaking Students, which includes two courses: 112 and 122 in Phase 1. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

Most of the content is detailed in the University Notes (NC- 112/05, and (122/06), the rest is obtained by self-directed learning and written assignments

Title	Code	Semester/Duration	Credits
ISLAMIC STUDIES-1 and 2	ISLAM-111+121	1 / Longitudinal	2

This is a National Requirement compulsory to all Muslim Students, which includes two courses: 111 and 121 in Phase 1. Their contents are: (1) the recitation of two Suras of the Holy Quran, which introduces a lot of behavioral and ethical issues for mankind as well as for Muslims, (2) the basic sources of religious thought and religious groups, (3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that are may arise from emerging issues that require ethical discussion, that leads to better understanding between individuals in groups, to help living in a peaceful and constructively save environment and society.

Most of this content is detailed in the University Notes (NC- 111/05, and (121/06), the rest is obtained by self-directed learning and written assignments

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES-1 and 2	SUDAN-110+120	1 / Longitudinal	2

This is a longitudinal National Requirement compulsory to all Students, which includes two courses: 110 in Phase 1, and 120 in Phase 2.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE-1 and 2	ENG-113+123	1 / Longitudinal	2

The sources of health information in the World are still in English. The Internet navigation to obtain information is basically in English. Some of the patients, attending clinics in Sudan, may only speak English language, especially with open-up of borders with economic development and of globalization. Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: (1) correct pronunciation of medical terns, including those related to health services in the country, (2) correct

reading and showing understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some pieces from English to Arabic, and three others from Arabic to English, both sets from medical literature.

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCE-1 and 2	ME-COMP-116+124	1/ Longitudinal	2

Most of the textbooks of medicine and allied sciences are available on CDs, in which a large volume of knowledge is saved and easily retrievable. There are many software packages demonstrating methods and techniques in clinical skills including patient rapport in history taking, clinical examination, investigations and management. Students and teacher can access the internet for the unlimited sources of health information, both at their professional level and public level for health education. Students and future doctors are educators who have to prepare smart documents and presentations for the health team and profession at large. Knowledge of programmes like Word, Excel, and PowerPoint are indispensable for anyone learner or teacher. Computer is important for students both in the developed or developing world, more so for the latter, who might not have inherited voluminous libraries in their Universitys and have to utilize the virtual libraries available all over the world. Medical journal as hard copies are difficult to be owned by one institution, now almost all are available on-line for those who can use the computer efficiently. The course is intensive focusing on the basic principles of computer electronics and applications relevant to health science education. This is mainly on the hand-on experience in dealing with famous programmes like DOS, Word, Excel, PowerPoint, Access and Internet Explorer. The use of CDs is stressed covered as well as having e-mails and navigating the internet for health information including how to access medical journals, and communicate with scientists worldwide.

Title	Code	Semester/Duration	Credits
BIOSTATISTICS	ME-STAT-117	1/ Longitudinal	2

A longitudinal course basic statistics as applied to health, to include: introduction to statistics, probabilities, data summary, presentation; measurement of central tendency; interpretation of variation (dispersion), population means, normal distribution; confidence interval, frequency distribution, sampling techniques, calculation and interpretation of the concept of confidence interval, the concept of p-value and its interpretation, the normal and skewed frequency distribution of biomedical data, and apply the appropriate test of significance for a given data set and a given research methodology (using t test as an example).

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICINE AND MEDICAL EDUCATION	ME-EDU-114	1/ Longitudinal	2

This is a three-week (2 CHs) block, starting with a simple medical problem that emphasize the meaning and message of health, health care delivery system in the country, the role of

the physician in health care, role of other professional and administrative staff, priority health problems, concepts and principles of learning, adult education and learning, student centred and problem-based learning, instructional techniques (lecture, small group etc), student assessment methods, holistic approach, interdisciplinarity and partnership concepts, curriculum development, College evaluation, leadership and professional ethics. Students are divided to groups to spend a week in a health facility, hospital theatre, hospital outpatient, health centre, various directorates and departments of Federal and State Ministries of Health, etc.. Meanwhile students are given discussion sessions on group dynamics and instructional methods, at the end of the course the groups present their field activity using a suitable audiovisual technique. Evaluation assesses the knowledge and attitudes of the students in these three areas: health system, group dynamics and instructional methods.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO PHARMACY ETHICS	PH-ETHIC-226	1/ Longitudinal	2

This is a detailed consideration of the functional aspects of pharmacy ethics.

Phase 2: Semesters 2-6, Basic Pharmacy Courses

Title	Code	Semester/Duration	Credits
PHYSICS FOR PHARMACY EQUIPMENTS AND INVESTIGATIONS	PH-PHYS-115	2/ Block 2 weeks	2

The basic principles of general physics are important for understanding certain mechanism that take part in the human body, and also, the technical background of many medical equipments. A medical professional is often confronted with a method of investigation or intervention that is based on simple physical or mechanical process in the human being and he/she has to deal cautiously with the machine and use it correctly considering its proper maintenance and patient's and worker's safety. These include physical chemistry, gas laws, physics of light and sound, and radiation.

Title	Code	Semester/Duration	Credits
BEHAVIORAL SCIENCE	BEHAV-119	2/ Block 2 weeks	2

A two-week block during Semester 1, to include: (1) introducing psychology, psychoanalysis, defense mechanism manifesting as behaviors, (2) role of stress in the etiology of physical and psychological illness, (3) coping with loss, grief and death, (4) biological basis of behavior (catecholamines, dopamine, neurotransmitters, neuropeptides, (5) cultural considerations in medical practice, (6) family structure and dynamics in health care, (6) health and illness behavior, (7) personality, (8) terminology of psychiatric disease, (9) medical bases of substance and drug abuse.

Title	Code	Semester/Duration	Credits
BASIC BIOCHEMISTRY	ME- BIOCH-118	2/ Block 4 weeks	2

A three-week block in Semester 1, to include: atomic structure, chemical bonding, chemical reactions, anabolism and catabolism, molecular formulae, solutions and solubility, molarity, molality, normality and molar fraction, acids and bases, buffers, hydrocarbons, isomerism, introduction organic compounds, classification of aliphatic and aromatic hydrocarbons, their properties and reactions; aldehydes and ketones, alcohols, phenols and ethers acids and amines benzenes and their derivatives; carbohydrates, lipids and proteins, vitamins and enzymes and coenzymes, carbohydrates, lipids, proteins, phospholipids, cholesterol, nucleic acids, nitrogen bases, enzymes and co-enzymes.

For students of pharmacy the course includes fundamentals of thermodynamics, and its application to chemical, biochemical and pharmaceutical systems.

Title	Code	Semester/Duration	Credits
GENETIC AND MOLECULAR BIOLOGY	ME-CELL-119	2/ Block 2 weeks	2

This is a detailed consideration of the functional aspects of cellular organelles and cytoarchitecture with emphasis on eukaryotic cells, including signal transductional, neurotransmission, transport and processing of proteins, extracellular matrix proteins, cell adhesion. This is in addition to the synthesis of DNA, RNA and proteins, with special focus on DNA structure, transcription, translation, replication, recombinant DNA technology, eukaryotic viruses and control of cellular differentiation in normal and pathological states. Laboratory sessions include PCR techniques and applications.

Title	Code	Semester/Duration	Credits
HUMAN BODY STRUCTURE AND FUNCTION	PA-NAT-126	2 / Block 4weeks	4

Upon the successful completion of this course the student will be able to describe and explain, at a basic level, the gross anatomy and introductory histology of the human body, especially the functional aspects of major tissues, organs, and systems including respiratory, cardiovascular, digestive, urinary, reproductive, endocrine and nervous with special emphasis on the interaction between these system and the major failures producing disease. More details are needed in neurobiology. There are some formal laboratory sessions. However a self-directed optional human anatomy laboratory is running all the time for independent study.

It also includes fundamentals of mamm alian physiology in a systematic pattern: function of the nervous system (neurotransmitter, sensory and motor systems), endocrine gland and their secretions, bone and muscle physiology, cardiovascular, respiratory systems, gastrointestinal and renal physiology.

In addition it includes the characteristics, features and functions of neurons, ganglia, synapses, neuroeffector autonomic nervous system and somatic reflex arch.

The concepts, definitions, processes and mechanism of membrane potentials, somatic and autonomic transmission, receptor activation and production of response. The structure, organization and regulation of adrenergic and cholinergic systems. Mechanisms (pathophysiology) of diseases related to cholinergic system (e.g. myasthenia gravis, peripheral neuropathy and diarrhea) and adrenergic system (e.g. hypotension, pheochromocytoma and asthma). Introduction to drugs affecting the autonomic system, their mechanism of action, metabolism, side effects, structure-activity relationships and clinical applications.

Title	Code	Semester/Duration	Credits
PRINCIPLE OF DISEASE- 1 and 2	ME-DIS-(212 A/B)	2,3 / Block 3,3 weeks	2,3

This is a six-weeks divided into two blocks on general pathology and microbiology to include: (1) general histology, (2) morphology, classification, staining reactions, and pathogenicity of bacteria, viruses, fungi, (3) sterilization and disinfection, (4) basic concepts in immunity, (5) principles of inheritance, introduction to molecular biology, and genetic defects underlying inherited disorders, (6) general pathology of inflammation, neoplasia and abnormal cell growth, (7) parasites and parasitic diseases, (8) anti-microbial and anti-parasitic drugs.

Title	Code	Semester/Duration	Credits
ORGANIC CHEMISTRY for pharmacy-1 and 2	PA-ORG-127 (216)	2,4 / Block 3,4 weeks	3,3

This includes systematic study of structure and function of organic material, including (1) Classification and nomenclature of organic compounds, chemical structure, physical and chemical properties. (2) Preparation and reactions, nucleophilic and electerophilic substitution reaction in aromatic system (Theory of resonance) (3) Orientation in electrophilic substitution reactions in benzene ring (4) Preparation and reactions of heterocyclic aromatic compounds, alkanes, alkenes and alkynes, the study of the functional groups such as alcohol, ether, epoxide amine, carboxylic acid, aldehyde and ketone, stereochemistry of organic molecules (5) Steriomerism, geometrical and optical isomerism and conformation, reaction mechanisms and stereochemistry of nucleophylic substitution, elimination and addition reactions, The theory and practice of UV, IR, NMR and mass spectroscopy. (6) Free radicals: structure and stability.

For pharmacy it is introduction to pharmaceutical chemistry, the course includes the foundations for understanding drug action in terms of specific interactions drug molecules and biological targets. It focuses on the chemical and structural properties of major biological macromolecules that interact with drugs.

Title	Code	Semester/Duration	Credits
PHARMACY ORIENTATION & CLACULATION	PA-CAL-128	2/Block 3 weeks	2

This is the first course introduced to the student about the pharmacy sciences. It is a three-week block in semester 1 to encompass: (1) Historical development of pharmacy: A survey of history of

pharmacy through ancient, Greek and Arab periods with special reference to contribution of Muslim scientists to pharmacy and allied sciences. Introduction to pharmacy literature (pharmacopoeia, formularies, codices, abstracts, etc.) (2) Definition of pharmacy, different pharmaceutical sciences and role of pharmacist (3) Basic dispensing techniques and ethical communication with patients (4) Introduction to dosage forms and routes of administration (5) Most of the important pharmaceutical calculations. (6) Introduction to prescription terminology, how can write, read and deal with prescription (main constituents of prescription).(7) Pharmacy abbreviations.(8)Preparation of simple dosage forms.(.(9)Types of measurements systems, conversion, percentage preparations.(10) Calculation of doses, dilutions, milliequivalents and millimoles.

Title	Code	Semester/Duration	Credits
PROFESSIONAL SKILLS-1,2,3 and 4	PA-SKIL-211, 221, 311, 321	3,4,5,6/Longitudinal	2

This course emphasizes oral communication skills to health professionals, including pharmacy for greater personal and professional confidence, in community pharmacy management or pharmacy owners and managers. It consists of small study groups presenting real life situations and role play. It involves communication skills, laboratory skills and pharmacy practices skills.

Title	Code	Semester/Duration	Credits
GENERAL AND PHYSICAL CHEMISTRY	PA-CHEM-217	3/Longitudinal	2

This course is deal with Solutions of non-electrolytes, concentration expressions ideal and real solutions, colligative properties of Solutions of electrolytes and ionic equilibria. Also it will broaden the student knowledge about modern theories of acids, bases and salts and methods of adjusting tonicity and pH.

Title	Code	Semester/Duration	Credits
HUMAN ENDOCRINE AND DRUG METABOLISM	PA-ME-TAB-214	3/Block 5 weeks	5

This review (done previously in Man and Environment) the relationship between the endocrine system and the nervous system in maintaining homeostatsis,general anatomy and physiology of the endocrine system and the physiological function of each endocrine organs, etiology, pathophysiology, clinical manifestations or signs and symptoms of common endocrine diseases. Pharmacological aspects of drugs used in the treatment of these diseases (rationale, mechanism of action, structure-activity relationship and adverse effects.

Staff and student presentations and problem-solving sessions on human metabolism, its regulation and defects in common metabolic diseases. Introductory concepts in pharmaceutical chemistry and its application in area of drug metabolism, drug disposition and drug toxicity.

Title	Code	Semester/Duration	Credits
PHARMACOLOGY -1&2	PA-PHARM- 213 (222)	3(4)/Block 4 weeks	4(4)

These courses review the general principles of pharmacology, it includes: (1) History and scope of pharmacology, classification of pharmacology. Drug classification, nomenclature and sources (2) Drug delivery system: advantages and disadvantages of oral medication. Advantages and disadvantages of non-oral medications (3) pharmacokinetics: drug solubility and passage of drugs across body membranes, plasma concentration of drugs and various factors affecting it. Factors affecting absorption, distribution, biotransformation and excretion. (4) Pharmacodynamics: drug receptors and theories, mechanism of drug action, specify of drug action and factors modifying drug action,(5)Define following terms, bioavailability, bioequivalence, therapeutic index, potency, efficacy, risk benefit ratio, selective toxicity, plasma half-life, dose response curve, area under curve, volume of distribution. (6) Drug side effects/adverse reactions in humans (7) Pharmacology of specific systems; autonomic, blood, cvs, cns,git systems (8) chemotherapy, immunopharmacololgy, and Toxicology.(9) Drug discovery and use of drugs in research. (10) mechanisms, types, clinical significance, case studies, and patient management recommendations regarding drug interactions.

Title	Code	Semester/Duration	Credits
PHAMACOGNOSY AND PLANT SCIENCES-1 and (2)	PA-COG-215, (225)	3(4)/Block 5(3) weeks	5(4)

This is a study in the wide range of plants used in pharmacy, particularly in the rich tropical and subtropical environments. The course considers and utilizes local achievements in this field, provides primary knowledge of natural product drugs to the pharmacy student and gives a chance to students to explore traditional preparations tracing their scientific plant origin and guidance in the process of screening of medicinal plants. In this course, the student will study: history and importance of natural products, botanical characters of medicinal plants and study the different cell contents; natural health products as herbal medicines, homeopathy, complementary and alternative medicines and related substance; the student will also study selected examples to illustrate contemporary usage of natural products; production of natural drugs including their collection, preparation, storage conditions and their preparation for use either in the crude form or as extracts. The course will introduce the student to different biogenetic pathways of secondary metabolites formation and their classification. The study will include the active constituents of drugs containing: Carbohydrates, tannins, volatile oils, lipids, glycosides, alkaloids, and unorganized drugs. The course study some narcotic plants and toxic plant, aiming to provide the students with information about their identification and treatment of their poisoning. The course will also covers chromatographic principals and methodologies specially column and planner chromatography as well as their applications in evaluation of natural products.

Title	Code	Semester/Duration	Credits
UNIT PROCESS	PA-UNPR-226	3/ Block (3) weeks	4

This course is introductory course to industrial pharmacy, the student study different unit process in pharmaceutical technology, starting from cleaning, weighting, to mixing, drying, flirtation and distillation, sterilization. The course also includes the storage design and conditions for raw materials and finished products. During this course the student will be introduced to (1) Mixing equipments used in liquid/solid and solid/solid mixing. Comminuting (size reduction), reasons for size reduction, factors affecting size reduction, size analysis. Sieving, energy mill, hammer mill (Ball mill, edge runer mill disintegrant, colloid mill, cutter mill, fluid energy mill, etc,). (2) Drying: theory of drying, drying of solids, classification of dryers, general methods, fluidized bed systems, pneumatic systems, spray dryer, freeze drying.(3) Clarification and filtration theory, filter media, filter aids, filter selection, equipment used for filtration.(4) Evaporation, general principal of evaporation, evaporators, evaporation relationship, density, consolidation, granulation, friability, compression (dry method, wet method, slugging), physics of tableting. Tableting machines and other equipment required, problems involved in tableting, tablet coating. (6) Encapsulation: capsulation hard and soft gelatin capsules.

Title	Code	Semester/Duration	Credits
PHAMACEUTICAL MICROBIOLOGY-1 and 2	PA-MIC-223, 316	4(5)/3 Block (3)weeks	3(3)

Provision of a basic understanding of the characteristics of the various types of microbial cell and their relevance to pharmacy. Basic instruction in the biology of microorganisms, basic medical microbiology and infectious diseases. It includes especially bacteria, fungi and viruses, studied or presented under several aspects of their biology, mode of transmission, mechanism of disease production, methods of treatment and preventions. Microbial pathogenesis includes host-parasite relationships, infectious diseases, immunology and immunopathology, molecular genetics, as well as laboratory methods relevant to pharmacy disciplines such as the principles and basis of microorganisms control in the pharmaceuticals & medicinal products and in the hospital and manufacturing environment through physical and chemical agents through sterilization, disinfection and preservation processes. It also includes antimicrobial therapy. The emphasis here is on the principles of antimicrobial therapy and the clinical use of various antimicrobial agents in the therapeutic process of infectious diseases. knowledge about mechanism of action, efficacy & antimicrobial spectrum, common adverse effects or toxicity, pharmacokinetic characteristics, appropriate diagnostic test and appropriate dosing, monitoring of antimicrobial therapy.

Title	Code	Semester/Duration	Credits
MEDICINAL CHEMISTRY 1&2	PA-CHEM-225 (518)	4(10)/Block 3(3)weeks	4(3)

To study the following with special reference to pharmaceutical applications: (1) Introduction to the fundamentals of medicinal chemistry and physicochemical properties of drugs relative to their biological effect (2) Classification of drugs on the basis of sources, structure, site of action and mode of action (3) Drug receptor interaction, structure activity relationship, physicochemical properties, chemical properties of the drugs, structural features of drugs. (3) Drug metabolism, inactive metabolites, biologically active metabolites, chemically reactive

metabolites, phase I and phase II reactions.(4) preparation and properties of medicinally important heterocyclic compounds such as: pyrrol, furan, thiophene, pyridine, pyrimidine and pyrazine. (5) Preparation and properties of heterocyclic compounds in which benzene-ring fused with five and six membered ring containing one heteroatom: indol, quinolone and Isoquinolone (6) General properties, chemistry, biological action, structure activity relationship and therapeutic applications of Alicyclic compounds, Alkaloids, Vitamins and Hormones(7) Biological principles governing the properties of different drugs such as CNS depressants & stimulants, drugs acting on autonomic nervous system, antihistamines, analgesics & antipyretics, local anesthetics,, steroids drugs, cardiovascular agents, gastrointestinal drugs, respiratory drugs, diuretics, hypoglycemic agents, prostaglandins, anti-neoplastic& antimicrobial & anti-tubercular agents. It also includes topics on synthetic methods in organic and inorganic chemistry, and organic spectroscopic analysis.

Title	Code	Semester/Duration	Credits
PHARMACEUTICAL ANALYSIS-1&2	PA-NAL- 312 (423)	5,7/3 Block (5)weeks	3(5)

This includes basic techniques and instrumentation applicable to pharmaceutical analysis: separation methods and quantitative analysis using chromatographic, titrametric, electrophotometric and spectroscopic methods. This course will introduce the student to the basic requirements common for drug analysis and or quality control for pharmaceuticals which concern with (1) General laboratory operations for development of analysis, assay of compounds based on chemical methods such as acid-base titration, oxidation-reduction titration, complexometric titration gravimetric, solvent extraction, and gasometric method (2) Potentiometric determination of pH of a solution and titration of an acid (3) Potentiometric determination of the strength of unknown solution of HCl with NaOH (4) Potentiometric determination of strength of acid in a mixture of HCl and CH_3COOH using standard alkali (5) Polarographic study (6) Conductemtric, refractometric and fluorimetric determination methods (7) Spectroscopic methods,ultraviolent spectrophotometry, visible spectrophotometry,infrared spectrophotometry, atomic absorption spectroscopy, mass spectrometry, NMR spectroscopy, X-ray spectroscopy (8) Chromatographic methods e.g. thin layer, column chromatography, iron exchange chromatography, gas liquid chromatography, high performance liquid chromatography.

Title	Code	Semester/Duration	Credits
PHYSICAL PHARMACY	PA-PH- 317	5/Block 4 weeks	4

The overall objective of this course is to teach the student some of the most important basic physicochemical facts needed for studying and understanding the design and the preparation of dosage forms. It introduces the student to the basic facts related to information in particular on liquid and solid materials. It gives information of value to pharmaceutical systems, on properties of solutions and the principles underlying the formation of solutions (from solutes

and solvents) and the factors that affect the dissolution process. The student will find out that the drug release and adsorption are strongly dependent on solution properties, such as solute dissociation and diffusion and flow properties. Micrometrics and particle size and shapes, distribution of particles methods, determination of particle size and importance of particle size in pharmacy. Study also the disperse system (e.g. colloids, suspensions, and emulsions). Rheological behavior and some techniques of their measurement will be taught. Rate and order of reactions. Kinetic principles and stability testing. The course links the pharmacy orientation and calculation course (already taught) with the more applied courses (Industrial pharmacy, biopharmaceutics and pharmacokinetics to be taught as to yet).

Title	Code	Semester/Duration	Credits
POWDER TECHENOLOGY	PA-PWTEC-314	5/Block 3 weeks	4

The student will continue study in this course the rheology of powder with emphasized on the physical properties of powder, the methods and apparatus used in particle size reduction and analysis, also the methods of mixing and instruments used in measurements, the flow properties of the powder and its problems.

Title	Code	Semester/Duration	Credits
PHARMACY PRACTICE-1 and (2)	PA-PRAC- 313 (323)	5(6)/Block 4(3)weeks	3(4)

Pharmacy practice includes professional conduct, prescription laws, scope and authority of programmes which relate to legal and ethical practice of pharmacy, focus on conceptual understanding of regulatory agencies and how pharmacy practically and ethically interacts with them, patient interviewing and communication skills, therapeutics of non-prescription products, ethics and home laboratory testing, pharmacy practice environments (principles of preservation and sterilization, aseptic technique and sterile rooms in ophthalmic and parenteral products and infusion devices, contamination and integrity of package tests.

The practice involves knowledge and skills in health economics as it applies to pharmaceuticals, as well as management techniques used to develop innovative pharmaceutical services, from needs analysis to business case presentation. Students should be reminded also on career opportunities in pharmacy..

It should include organization and management concepts, in health system integration, interorganizational linkages, strategies and plans, health service improvement of policies and regulations, financial management, alternative therapies, contemporary perspectives in organizational psychology and behavior, leading or helping in leading the human resource potential of a health team or diverse specialty workforce.

Title	Code	Semester/Duration	Credits
PHARMACO-EPIDEMOLOGY & ECONOMICS	PA-EPIC-327	5/Block 3 weeks	3

Because of growing pressure on the health care budget on the underdeveloped countries par-

ticularly in Sudan, appropriate justification of current expenditures and future investments' in public healthcare are becoming increasingly important. It is anticipated that international pharmaceutical companies will increasingly invest in pharmacoeconomics while government staff will become more experienced in appraising the dossiers, thus resulting in upward momentum in the quality and usability of pharmacoeconomic data.

This course shall make student understand the link between cost effectiveness and utility or quality of life and use appropriate different styles of analysis and came up with right decision to use or not to use the specific medicine.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO CLINICAL PHARMACY	PA-CLIN- 322	6/ Longitudinal	2

This is an introduction to clinical pharmacy and pharmaceutical care. In addition to the theoretical concepts, students will be exposed to patients and patient medical records, drug basic pathophysiology of common diseases (respiratory, cardiovascular, gastrointestinal, cancer, endocrine, metabolic and nervous), drug formulary, therapy choice, drug monitoring and concepts and practical experience (problem-based) sessions on poisoning and toxicity. Topics include clinical pharmacokinetics of some selected drugs. The course reviews the behavioral aspects of working as a member of complementary health team.

Title	Code	Semester/Duration	Credits
PHARMACEUTICAL TECHNOLOGY	PA-TEC- 315	6/Block 4 weeks	4

This course provides in-depth study of physical and chemical principles which are involved in the development, formation and stabilization of selected pharmaceutical dosage forms for optimization of drug bioavailability and therapeutic utility. The students learn about formulation, preparation of tablet and capsules, liquid and semisolid dosage forms. The study include powder technology (granulation and pelletuzation), tabelleting, coating, encapsulation and packing of pharmaceutical products, also this course involves the assessment of dosage forms according to pharmacopeias, problems of manufacturing process of each dosage form, non conventional dosage forms and their delivery systems, novel drug delivery systems, active and passive drug delivery system, other novel GIT systems, novel topical drug delivery systems. Modified drug release dosage form, the concept of sustained release, first order release approximation, multiple dosing, implementation of designing, approaches based upon dosage form modifications. Product evaluation and testing, matrices tablets, control release technology, method of particle coating, instrumentation in granule manufacturing. Stability of different dosage forms and packing materials.

Title	Code	Semester/Duration	Credits
DOSAGE FORM DESIGN	PA-DOS-326	6/Block 3 weeks	3

This course is about the fundamentals of pharmaceutical processing, formulation and biopharmaceutical considerations. It offers knowledge and skills on how drug dosage forms can be used as

drug delivery systems, assuming that the student is introduced to routes of administration, pharmaceutics, biopharmaceutics, bioavailability, bioequivalency, rate and extent of availability, onset and duration of effect, getting to the site of absorption, dissolution, disintegration, first-pass effect, passive diffusion, and active transport. Emphasis includes stability, storage and packaging.

The student learns the major physical, chemical and biological factors which affect the design of dosage forms as drug delivery systems and the interactions among those factors. It emphasizes how to communicate knowledge of drug delivery systems to their clients (physicians and patients) to ensure proper handling and use.

The forms include tablet, capsule, liquid, dermatological and transdermal preparations, sustained release forms, aerosol, inhalation preparations and novel drug delivery systems.

Title	Code	Semester/Duration	Credits
BASIC THERAPEUTICS	PA-TREAT- 325	6/Block 4 weeks	4

A four-week block for medical management of disease conditions, to include: (1) definition of a drug, (2) development of a drug, (3) drug absorption and dynamics, (4) rational use of drugs in the management of emergency and common problems, including drug prescription for rhinitis, sinusitis, laryngitis, bronchitis, pneumonia, pulmonary TB, (5) interaction between drugs and of genes. With drugs for example glucose-6 phosphate dehydrogenase deficiency and sulphonamides and antimalarials, (6) clarify interrelationship between bacterial infections, inflammatory mediators, anti-inflammatory drugs and antimicrobial drugs, (7) effects of morphine, (8) clinical uses and side effects of aspirin, paracetamol, and non-steroidal anti-inflammatory drugs, (9) outline the use and side effects of levodopa (in parkinson's disease), tricyclic antidepressants (in depression), benzodiazepines (in insomnia), antipsychotic drugs (in schizophrenia), antiepileptics (in seizures), muscarine antagonists, anticholinestrases, sympathomimetics, chemotherapeutic agents and beta blockers. The course taught as problem-based pharmacotherapy and includes also precautions in the proper selection, dosage monitoring of drug, and recognition of clinically significant, efficacious and/or toxic drug interactions.

Title	Code	Semester/Duration	Credits
PHARMACO-INFORMATICS	PA-INFO-324	6/Block 3 weeks	4

This is a course on the current and evolving information technologies, planning management and operational issues associated with information technology. It emphasizes building fundamental skills in healthcare informatics, database design and applications, pharmacy components of medical records, electronic medical records, clinical (pharmacy) systems, drug information systems, genome project and its clinical applications: pharmacogenomics, telemedicine, privacy and security for clinical and pharmacy data, informatics as applied in pharmacy robotics, survey and evaluation of online sources.

The course requires adequate orientation to clinical services including patient interview techniques, managing patient visits and records, actual experience in drug information retrieval, analysis and dissemination. Utlization of clinical drug literature

Phase 3: Clerkships for Industrial and Clinical Rotation

Title	Code	Semester/Duration	Credits
DRUG ABUSE	PA-DAB-411	7/Longitudinal	2

This a longitudinal course introduced the students to forensic pharmacy and pharmacy laws and emphasis on the problems of drug abuse and intoxications could occur from such abuse such as ethanol intoxication and methanol intoxication and who are the groups vulnerable to intoxication. Also the course contains the poisonous gases and hair dye poisoning problems. The student also study the international control of narcotic and drugs of abuse.

Title	Code	Semester/Duration	Credits
RATIONAL DRUG USE	PA-RDU- 427	7/Longtiudinal	2

Irrational use of medicines is a major problem worldwide. WHO estimates that more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of patients failed to take them correctly. In this longitudinal course the student s (1) discuss the concept of rational use of medicines (2) familiarize themselves with the concept of essential drugs and understand it importance in promotion drug use (3) identify the major causative factors underlining irrational use of medicines, its various forms and provide clinically significant examples. (4) Discuss the current trends of polypharmacy. (5) Recognize the advantages and potential benefits of therapeutic guidelines and standards treatment protocols on promoting appropriate use (6) reviews different intervention strategies and assess their potentials in promoting rational use of medicines. (7) Asses rationality of drug prescribing, dispensing use and health care provision of services. (8) Recognize the important interactions between health care providers (medical doctor as prescribers and pharmacist as dispensers). (9) Acquire pharmacotherapeutic knowledge essential to development of the scientific basis of the concept of rationality (e.g. the outcome of triple interactions, drug, diet, disease DDDIs).

Title	Code	Semester/Duration	Credits
DRUG DESIDN	PA-DRUG- 421	7/5 weeks	5

This a four weeks four credit hours course. The principal of Drug Design course aims to provide students with understanding of the process of drug discovery and development from identification of novel drug targets to the introduction of new drugs into clinical practice. It covers the basic principles of how new drugs are discovered with emphasis on lead identification and lead optimization, classification and kinetics of molecules targeting enzymes and receptors, prodrug design and applications, as well as structure-based drug design methods. Recent advances in the use of computational and combinatorial chemistry in the drug design. This course builds upon the foundation of chemical knowledge on structure-function relationship of proteins, enzymes, peptides, carbohydrates and lipid biochemistry. Drug designing, discovery of lead structure (different approaches). DNA recombinant technology/Genetic engineering

(with reference to drug designing) structure- activity relationships of complex drug molecules specifically information on chemically important aspects of drug delivery, stability, receptor affinity and selectivity, metabolic vulnerability and distribution.

Title	Code	Semester/Duration	Credits
PACKING TECHENOLOGY	PA-PAC- 424	7/2 weeks	2

This a four weeks four credit hours course. In this course the student study the packing materials and packing design. The student introduced to different type of packing materials come in contact and outer packs and the advantage and disadvantage of each type. The student can differentiate between Aluminum foil pack, PVC pack. Plastic pack and paper pack, also the method of synthesis of each type.

Title	Code	Semester/Duration	Credits
QUALITY ASSURANCE IN PHARMACY AND INDUSTRY	PA-QUAL -422 (426)	7/Block 2 (2)weeks	2(2)

This starts with an introduction to the general concepts of quality assurance, specific application to pharmaceutical and pharmacy practice in environmental control, scrutiny of raw materials, control of solid and liquid dosage forms, packaging, storage, distribution, and statistics of stocks and methods of process control. Validation of pharmaceutical processes, control of components and drug product containers and doses. Production and processes controls. Packing and labeling controls, holding and distribution, repacking and relabeling. Regulating basis for person validation, sterilization validation of sterile products. Validation of solid dosage form. process of validation and quality assurance. Prospective process validation, validation of water system for sterile and non-sterile products, cleaning validation, equipment validation, process validation of raw materials. Analytical method validation. It also include different tests of liquid, emulsion, solid state and release product, general knowledge of B.P, USP etc.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF MARKETING & MANAGEMENT IN PHARMACY	PA-MARK-414	7/Block 2weeks	2

The student shall enter the market of employment facing different challenges. This course will extend the circle of consciousness of students beyond their recent environment, and will highlight the different aspects of market supply them with excellent understand of different patterns and forces harmonizing the market locally and internationally to master their own road and dealing with different situations, and how to overcome problems, and convince other people and know how to organize themselves, their work and acquire self confidence. The student should be able (1) understand the right concept of marketing (2) understand the structure of market (3)Understand the different behaviors of market & market orientation (4) understand the global activities of market (5) understand the need of market and customer and how to satisfy them profitably (6) understand the customer behaviors and handle them in right way.

(6) Understand nature and principles of management, types and functions of managers (7) production management, marketing management, sales management, (8) Planning, purpose and types of planning, steps in planning,. Organizing management control systems. Requirements for adequate control. Critical control points and standards. Motivation, innovation and creativity, communication.

Title	Code	Semester/Duration	Credits
RESEARCH METHEDOLOGY	PA-REC-429	7/ Block 2weeks	2

A two-week block of two credit hours, the student before graduation have to conduct a research as a graduation project, so he have to be acquired about the method of research. This road map course learns how to conduct a research. It includes (1) Introduction to research methodology and identification of research problems (2) Types of data (3) Formulation of research objectives (4) Types of studies and research designs (6) Sampling and sample size calculation (7) Data collection (8) Data processing and analysis (9) proposal and research writing. By the end of this course the student could be able to clarify the way a research is conducted so as to perform their own researches, and to explain research terminology and process and also differentiate between different types of research studies and understand published scientific papers and gain ability to perform research.

Title	Code	Semester/Duration	Credits
MEDICAL ETHICS & FORENSIC PHARMACY	ME-LPAR-413	8/Longitudinal	2

The student should show an understanding of the (1) history of medicine; before and during the Islamic era, (2) the role of the Moslem scholars in the practice of medicine, research and medical ethics, (3) the milestones of medical education in the Islamic era, (4) the fight of illness and the sick, the religious regulations concerning treating the sick person, how does the sick person performs his rituals: cleanliness, prayers, fasting, pilgrimage? Also, (5) the visiting of sick person, (6) managing a death episode, (7) the religious conduct when males are managing female disease and vice versa, (8) the emerging controversial ties of vitro fertilization, transplantation, brain death, cloning, genetic engineering. Students should be aware of the (9) Fight of health preservation including cleanliness, sleep, moderation in eating and drinking, the jurisprudence of toxic substances and narcotics, infectious diseases, breast feeding, consanguity marriage, quarantine, death and funerals, dissection of human body for teaching and law, (10) medical behavior, professional ethics, responsibility of a health professional, (11) issues in protection of acts of a health professional and (12) giving an expert witness at court. (13) identification of drug causes of death (14) description of postmortem changes from poisons and drug intoxications, and determination of the time of death, (15) identification common types of toxins, poisons and poisoning, and determination of the environmental and criminal causes of common poisoning incidents.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN OF DRUG FACTORY	PA-FAC- 425	8/Block 3 weeks	3

After completion basic theoretical lectures and practical hours in the college about pharmaceutical technology and quality assurance the students have to visit a pharmaceutical factory in Sudan as three weeks three credit hours field work to come over the GMP requirements for architectural design, documentary system during each production process, also to understand the concept of Standard Operating Procedures (SOP) in different lines of production units (Tablet, Capsules, Liquid and Semisolid lines), Also the students have the chance to make a visit to premises outside Sudan as an elective course during mid-semester vacation period to get some experience aboard.

Title	Code	Semester/Duration	Credits
INTERNAL MEDICINE	PA-MED-411	8/ Block 3 weeks	3

This is a 3-week continuous block, clerkship and bed side training in hospitals. During this 3-week clerkship, the student (1) demonstrate good attitudes, ethics and professional behavior in the pharmacy practice in internal medicine (2) general knowledge of obtaining history relevant to the medical problem in general practice, develop an idea on physical examination and the requesting suitable investigations, not requested to suggest differential or provide diagnosis. He has to select (or suggest) proper treatment, for the condition and advice both physician and patient on drugs used, with special emphasis on essential drugs used in common medical problems (headache/migraine and various types of pains and colics, seizures, meningitis/encephalitis, malaria, typhoid fever, schistosomiasis, leishmaniasis, hypertension, stroke, dementia, disorders of the motor systems. coronary heart disease, congestive heart failure, arrhythmias, pneumonia, asthma, causes of dyspepsia, nephrosis, nephritis and renal failure, diabetes, worm infestations, vomiting diarrhea, constipation, dehydration, nutritional deficiencies, anemias, hematological malignancy, bleeding disorders, thyroid disease, obesity, adrenal insufficiency, Cushing syndrome, osteoarthritis, rheumatoid arthritis, SLE, gout.

Title	Code	Semester/Duration	Credits
GENERAL SURGERY (including anaesthesia)	PA-SURG-414	8/ Block 2weeks	2

A two-week continuous block, interrupted clerkship and bed side training in hospitals, to include: (1) demonstrating good attitudes, ethics and professional behavior in the department of surgery (2) demonstrating knowledge of basic pharmacy sciences relevant to the practice of surgery, (3) Acting promptly in urgent and emergency surgical conditions, e.g. burns, acute abdomen, head injury, (see also ERM-407, (4) outline drug management of cardiac surgical problems, brain tumors, abdominal masses, (5) anesthetics for preoperative and postoperative drug management, (6) detail essential drugs used in general surgery.

Title	Code	Semester/Duration	Credits
EMERGENCY MEDICINE	PA-MER-412	8/ Block 2 weeks	2

A two-week block clerkship and bed side training in hospitals designed to contain common medical and surgical emergencies seen in Emergency Department, mostly undifferentiated cases, that require life-saving management (drugs and preparations used) including prioritization, resuscitation and stabilization, simultaneous management of more than one patient, focus on relevant treatment history and terminology of working differential diagnosis and quick courageous attitude, and documentation of drug records of the patient, psychological care, and ethical issues in emergency. Emergency conditions include: trauma resuscitation, poisoning, cardiac dysrythmias, myocardial infarction, epilepsy and seizures, coma, status asthmaticus, urine retention, acute abdomen.

Title	Code	Semester/Duration	Credits
CHEST & CARDIOLOGY	PA-CVRS-413	8/ Block 2 weeks	2

A two-week block, clerkship and bed side training in hospitals to include: (1) reviewing the pharmacy sciences relevant to cardiology (2) outline drug management of cardiac problems such as congestive heart failure, hypertension etc. (3) reviewing the pharmacy sciences relevant to chest (4) outline drug management of problems such as asthma and COPD (5) drug management of emergency in cardiac& chest problem.

Title	Code	Semester/Duration	Credits
ORTHOPEDIC SURGERY	PA-ORTOP-415	8/ Block 2 weeks	2

A two-week block, after or in integration with the general surgery clerkship & surgery to include: (1) reviewing the pharmacy sciences relevant to orthopedic practices (3) outline drug management of emergency and trauma in orthopedics (multiple injuries after road traffic and other accidents, (4) principles of fracture pain management, (5) management of pain in common pyogenic and chronic bone and joint infections, rheumatoid arthritis and osteoarthritis, (6) recognizing, diagnose and outline subsequent steps in the management of back pain, congenital dislocation of hip, and (7) detail essential drugs used in orthopedic problems.

Title	Code	Semester/Duration	Credits
DERMATOLOGY	PA-DERM-417	8/ Block 2 week	2

A two-week block, clerkship and bed side training in hospitals, to include: (1) outlining the basics of dermatologic terminology, (3) presented with any of the following real, verbal or written dermatologic problems/conditions (already diagnosed) suggest drug management and anticipate main and side or toxic effects: the conditions are (a) acne and related disorders: acne, rosacea and perioral dermatitis, (b) eczema (endogenous and exogenous) and atopic and seborrheic dermatitis, (c) papulosquamous diseases: psoriasis, lichen planus, pityriasis rosea, (d) pigmentary disorders: vitiligo, melasma, (e) common skin infections: fruncle, carbuncle, impeti-

go, cellulites, dermatophytosis, candidiasis, viral wart, herpetic infections, molluscum, scabies, leishmaniasis, (f) bullous diseases: pemphigus, bullous pemphigoid, dermatitis herpetiformis, (g) connective tissue diseases: lupus, dermatomyositis, scleroderma, (h) drug reactions.

Title	Code	Semester/Duration	Credits
OPHTHALMOLOGY	PA-OP-TAL-416	8/ Block 1 weeks	1

A one-week block, clerkship to include: (1) recognize the critical role of the primary care pharmacist in preventing visual loss through prompt and appropriate treatment and timely referral, (2) drug management of ocular emergencies and trauma, (3) outline subsequent steps in drug management of the common ocular conditions: red eye, impaired vision, painful eye, cataract, glaucoma, exophthalmos, retinopathy or eye manifestations of systemic disease, abnormal ocular mobility, (5) detail essential drugs used in ophthalmology.

Title	Code	Semester/Duration	Credits
PSYCHIATRY	PA-SYC-522	9 / Block 3 weeks	3

A three-week block, anytime during semester 9, clerkship and bed side training in hospitals to include: (1) demonstrating professional ethics and attitudes appropriate for mental health practice, (2) establishing a rapport with a variety of patients and families, being aware of own emotional responses and family concerns on raising certain in appropriate questions, to help in compliance of drug treatment (3) being aware of the various relevant biological, psychological and social factors related to the etiology and management and rehabilitation of a psychiatric patient, (4) drug management of psychiatric emergencies (e.g. hostile or aggressive patient), depression, schizophrenia (5) drug management of) mood disorders (e.g. mania), anxiety (e.g panic, obsessive-compulsive, phobias), personality disorders, cognitive impairment and substance (chemical. alcohol, drug) use disorders, dementia, delirium, psychoses, human sexuality problems, and (6) detail essential drugs used in psychiatric practice.

Title	Code	Semester/Duration	Credits
PEDIATRICS	PA-PED-524	9 / Block 3 weeks	3

A three-week continuous block, some of the contents is more relevant to include: (1) demonstrate professional ethics and attitudes appropriate for pediatric practice, (2) review the pharmacy sciences relevant to child/adolescent problems, (3) suggest drug management of emergency pediatric conditions (convulsions, fever, dehydration, respiratory distress, etc..), common neonatal problems, child nutritional problems, (4) suggest drug management of nephritis, nephritis, renal failure, obstructive uropathy, IDDM and other endocrine disorders in childhood, congenital and acquired heart disease, childhood malignancies (6) analyzing community problems related to child health, immunization and disorders of immunity, and (7) essential drugs used in pediatric practice.

Title	Code	Semester/Duration	Credits
EAR, NOSE AND THROAT	PA-ENT-517	9 / Block 3 weeks	3

A three-week block, clerkship and bed side training in hospitals, addressing clinical activities in the ENT department, using knowledge of basic pharmacy sciences in recommending drug management done by senior members of the ENT health team. Details of medications in the following disorders:, common cold, sinusitis, tonsillitis, laryngitis, otitis media, and neoplasia, and detail essential drugs used in ENT practice.

Title	Code	Semester/Duration	Credits
OBSTETRICS AND GYNECOLOGY	PA-OBGYN- 521	9 / Block 3 weeks	3

During the three-week clerkship, the student (1) demonstrate good attitudes, ethics and professional behavior in the practice of OB/GYN, (2) recognize the terminology and basic presentations of problems seen in antenatal care (contraception, infertility, bleeding in early or late pregnancy, pregnancy complicated with systemic disease, high risk pregnancy, disorders of menstrual cycle and outline their drug management) and in urgent and emergency ob/gyn conditions, (3) drug management of in community problems related to women health, (6) drugs indicated labor progress, monitoring and control, genital infections, and (4) detail essential drugs used in ob/gyn problems, including male and female sexual lives.

Title	Code	Semester/Duration	Credits
FAMILY MEDICINE	PA-FAM-523	9 / Block 3 weeks	3

This three-week block,ideally the student should be attached to a known family in the vicinity of the University early on in the curriculum the last four week consolidate his/her activity during the attachment. Alternatively the following components should be covered: basic interviewing, communication skills and nutritional counseling, approach to drug management of headache, backache, dyspepsia, a febrile child, vaccination, bronchial asthma, hypertension, diabetes mellitus, sore throat, iron deficiency anemia, irritable bowel syndrome, intestinal worms, otitis media, depression, anxiety and other psychiatric problems, obesity, smoking habit, alcoholism, drug addiction, ischemic heart disease, arthritis.

Title	Code	Semester/Duration	Credits
PHARMACEUTICAL BIOTECHENOLOGY	PA-BIOTEC-526	9 / Block 3 weeks	2

This course includes an extensive study of the biotechnological approaches that have a great value in production of human useful compounds. During this course, the student will learn many different techniques that help us to produce clinically useful compound like drugs produced via fermentation and plant tissue culturing, furthermore, production of clinically and scientifically implicated products through recombinant DNA technology. The course is covering

many important topics including cell culture, composition, and function. The methods that help the scientist to produce and improve the recombinant DNA will be discussed, including restriction enzymes, plasmids, polymerase chain reactions, DNA sequencing, and quantification of DNA via southern blot analysis. Gene therapy and the production of transgenic and knockout animal, monoclonal antibodies and vaccines will be discusses.

The course will also cover the method and techniques employed for screening medicinal plants for their bioactive constituents such as photochemical screening. It also discusses recent developments regarding methods of extraction, isolation, purification and application of the spectroscopic techniques for the identification and interpretation of their spectral data.

Title	Code	Semester/Duration	Credits
COLLEGE DRUG MINI FACTORY DESIGN	PA-COLLB- 529	9/ Block 2 weeks	2

This a three weeks two credit hours course. In this course the student study of principles of drug mini factory design and examples of dosage forms application in the mini factory also the location importance and necessity of architectural design to meet the GMP requirements.

Title	Code	Semester/Duration	Credits
DRUG STABILITY & SHELF LIFE STUDY	PA-STAB- 527	10/ Block 3 weeks	4

These three weeks of four credit hours course. In this course the student study different factors affecting stability of different pharmaceutical dosage forms such as temperature, light, humidity, etc,,,. It includes the study of physical and chemical stability, accelerated and real time stability, problems of stability. The student could be able to know how to calculate the shelf-life of drug.

Title	Code	Semester/Duration	Credits
HERBAL & ALTERNATIVE MEDICINE & PHYTOCHEMICAL SCREENING	PA-HERB-528	10 / Block 3 weeks	3

This course addresses the rapid growth of nonprescription herbal products marketed in pharmacy herbal and food supplement stores and therefore it is designed to assist the student in selection of nonprescription products for patients whose choose self-medication, the course will discuss mechanisms of actions, adverse effects, contraindications precautions, drug-drug interactions and drug herbal interactions of nonprescription drugs to help class participants to be better informed of health care providers. The pharmacopeia standards and quality control methods for herbal methods will be also covered. At the conclusion o this course, the students will be able to: (1) Understand the use and side effects of natural products and over-the-counter drugs used to treat common disease states, (2) Determine possible contraindication and interactions (3) Select appropriate nonprescription products and/or natural products if indicated (4) consult the patient on the proper dosage and use of the product, (5) Monitor the patients' response to the recommended therapy.

Title	Code	Semester/Duration	Credits
BIOPHARMACEUTICS & PHARMACOKINETICS	PA-BIOCEU- 525	10/ Block 3 weeks	3

This a three weeks three credit hours course. In this course the student study the mathematical characterization of the process of absorption, distribution, elimination of drugs, know about body compartments (One compartments and two compartments), pharmakinetics parameters such as half-life of the drug, T max and C max, bioavailability of the drug etc…,

Title	Code	Semester/Duration	Credits
HOME DRUG STORGE	PA-DRUG-530	10/ Block 1 weeks	2

This one week two credit hours course. In this course the student introduced to the home drug concept, also the chronic and acute disease home drug storage and emergency drugs home drug storage and first aid services could be offered by pharmacist,

Title	Code	Semester/Duration	Credits
Graduation project progress GRADUATION PROJECT PROGRESS & THESIS SUBMISSION	PA-REC- 531	10/Block 4 weeks	4

Pharmacy sciences are rich areas in research topics. As the student learned a research methodology in semester 8 the student required to fullfill his study by doing a graduation project in any field of pharmacy sciences. The student is given the choice of one project from the following areas: pharmaceutics (formulation and development of suspension, emulsions, tablet, semi-solid preparations, microcapsules, sustained release tablet and determinations of stability, storage time and expiry date). Pharmacology (Experimental, applied pharmacology), Clinical pharmacy or Industrial pharmacy (pharmaceutical technology or quality assurance), pharmacognosy, pharmaceutical chemistry etc….

FACULTY OF

DENTAL MEDICINE & SURGERY

UNDERGRADUATE & GRADUATE PROSPECTUS

VISION AND MISSION

The Faculty of Dentistry National Suda n- Sudan strives towards developing the highest standards of academic professional excellence in dental medicine and surgery. The various parts of this programme aim to produce ethically responsible, innovative, critically thinking dental practitioner committed to meeting the health and developmental needs of all communities in the Sudan and the rest of the world, appropriately and efficiently. The curricula teach the students how to learn and continue as lifelong learners in dentistry. The Programme aims to be the most respected educational institution of dental sciences and practice, as evidenced by high quality of premises, preparations, up-to-date administration and governance, job- and research directed instruction, quality of graduate and their ethical, professional and scholarly contribution.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Dental Medicine and Surgery, has to:

1. Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.
2. Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.
3. Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Dental Medicine and Surgery.
4. Pay the published fees: 80,000 SDG or US $ 8400 [international students] [2018-2019]

CAREER ADVICE

Students qualified with this Bachelor degree [B DMS] pass through a track decreed by the Sudan Medical Council and are thus temporarily accredited as dentists. After working for a period specified by the Ministry of Health in each specialty/ discipline, grads acquire a license of permanent registration with the Sudan Medical Council and may pursue master's and doc-

toral degrees or licensing in any of any of the disciplines of dentistry or basic science to qualify for specialized practice as a consultant/specialist or university teaching. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence.

FACULTY OBJECTIVES

The objectives of the Faculty of Dental Medicine and Surgery National University, are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National College philosophy and message.
2. Graduate a dental and oral health professional at the internist levels with strong community orientation and ethical components, and self-directed learning capabilities.
3. Contribute to community development through health services provided in its own health institutions and other institutions co-operating with it, through the following: (a) partnership in designing health programmed and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) contribution in continuous education through short and long term courses, to improve efficiency of health workers, and (c) provision of essential equipments and supplies to improve quality of services, through partnership with the Ministry of Health.
4. Strengthen medical and health research in dentistry and related professions, making use of the National College's accessibility and communication privileges.

CURRICULUM OBJECTIVES [Characteristics of the Dentistry graduate]

A graduate of the Faculty of Dental Medicine and surgery - National University should be able to:

1. Adopt the strategies of the College and abide by its objectives and rules stated in its constitution.
2. Observe in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Medical Council, and Sudan Allied Health Professionals Council), and maintain good and honest relations with his/her patients, their families, his/her colleagues across all sectors involved in health.
3. Appreciate the value of diversity and multi-ethnicity in solving dental health problems with emphatic, humane and fair practice.
4. Diagnose and manage problems of dental and oral health, and pay attention to other health problems prevalent at the level of the individual, family or society, with special emphasis on the nutritional and environmental problems common in developing countries, and plays an active role in health promotion.
5. Integrate basic, community, clinical and physical sciences in solving the individual dental and oral problems
6. Use scientific knowledge in diagnosis and management of dental and oral problems, according to known methods of problem solving and integration, and explains the scientific structural

(anatomical), functional (physiological, biochemical), morbid (microbiological, pathological), and therapeutic background related to the problems

7. Manage relevant dental and oral emergencies, and decide and act properly on cases needing referrals to specialized centres or personnel.
8. Accepts to work in all settings according to needs, and act to improve health service delivery systems both quantitatively and qualitatively.
9. Encourage community participation and act in recruiting various sectors in defining health and health- related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices.
10. Adhere to "health team" approach, acting as an efficient member, and ensuring both effectiveness and homogeneity among the members.
11. Administer a dental and oral health "unit" or "centre" efficiently according to scientific, medical, statistical, economic and legal bases.
12. Continue to consider elements of efficiency, costing and economic implications in his/her diagnostic and therapeutic choices, particularly the financial abilities of his/her patients.
13. Acquire the skills of teaching, learning and communication efficiently to carry out his/her duties in health education and in winning the confidence of patients and their families and societies.
14. Acquire the skills of self education (self-directed learning), and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/her colleagues in the health team.
15. Carry health or health-related research in dental and oral health, alone or with a health team, using scientific methods known in such activities.
16. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career, and skills of computer-assisted presentations.
17. Acquire postgraduate qualification in the discipline of his/her choice, recognizing the needs of the society for certain specialties, particularly general practice and family medicine.

Feedback to students after mid-course and end of course assessment is an essential part of the dental programme

EDUCATIONAL STRATEGIES AND METHODS

The learning strategies emphasize the following: (1) early acquisition of basic skills, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problem-oriented learning, (4) community-oriented and community-based activities, (5) integration of basic science, community and clinical dentistry, in a multidisciplinary approach, (6) self- and peer education and evaluation, (7) team-work approach, (8) a wide range of electives, (9) continuous evaluation and (10) continuous education.

The faculty adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions -once/ week at least

(3) field practice in rural and primary health care settings and societies not less than 1/5th of the timetable, (4) practical sessions (laboratory, clinical, pharmaceutical industries) not less than 1/4th

of the curriculum timetable, (5) skill laboratory (weekly) sessions, (6) lectures -not more than 1/3rd of the curriculum timetable (not more than 3 lectures/day). (7) educational assignments, reports and research activities (as many as the programme would allow- at least one per module), (8) electives -not more than 10% of the curriculum timetable, and (9) graduation project. Feedback to Student ajiez Mid-erserze and end-f- uerae assessment in an erunhat parke the denrhi my Programme

TIMETABLE

The B. D.M.S. requires five years (10 semesters) divided into three phases: The first three years (Semesters 1-6) are based at the main campus of the University with one or two days off campus in visits to relevant institutions and training facilities. The last two years (Semesters 7-10) are based at clinical training sites, mainly at the campus clinics. When the hospital in completed, training will be within the outpatient clinics, operation theatres and wards. with only one or two days at the main campus. The programme schedule therefore involves considerable commitment from students to be on time at the respective sites specified in their daily timetables. Each student should have a functioning e-mail address for last moment changes, a frequent incident in field training programmed.

Phase 1:Introductory courses and university requirements =Semesters 1

Phase 2: Requirements (cont.)+ dental sciences =Semesters 2-6

Phase 3: Clinical training =Semesters 7-10

Semester 1 [24 CHs - 16 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Islamic studies-1& 2	ISLAM-111	Longit.	2	-	-	2
2	Arabic language-1& 2	ARAB-112	Longit.	2	-	-	2
3	English language-1& 2	ENG-113	Longit.	2	-	-	2
4	Sudanese studies-1& 2	SUDN-110	Longit.	2	-	-	2
5	Biostatistics	ME-STAT-117	Longit.	2	-	-	2
6	Orientation week	-	-	-	-		-
7	Computer science-1& 2	ME-COMP-116	3	1	-	1	2
8	Physics for medical equipments & investigations	ME-PHYS-115	3	3	-	-	3
9	Introduction to medicine and medical education	ME-EDU-114	3	1	1	1	2
10	Basic biochemistry	ME-DIS-212 A	4	2	1	1	3
			17	16	2	3	21

Examination of longitudinal courses (+re-sits) 2 weeks

Repeat courses or examinations for late comers and failures.

Semester 2 [22 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Computer science-2	ME-PAR-125	2	2	-	1	2
2	Genetics & molecular biology	ME-GET-119	2	2	_	-	2
3	Dental morphology	DE-NAT-125	2	1	-	1	2
4	Growth and development	ME-GROW-126	3	2	-	1	3
5	Man and his environment	ME-ENV-127	4	2	1	1	4
6	Behavioural science	ME-BEHAV-119	2	2	_	-	2
7	Principles of disease-I	ME-DIS-212 A	3	2	-	1	3
			19	13	1	5	19

Examination of longitudinal courses (+re-sits) 2 week

SUMMAR 1 AND ELECTIVES.

1.Dental records and data collection (PA-SUM-131) 2 CHs

2.Medical genetics (E-131) 2CHs

3.Elective (E-132): A 1000 -word report on “Internet Sources of Dental Sciences” 1CH 4. Repeat courses or examinations for late comers and failures.

FIRSt YEAR PROGRAMME EVALUATION

Semester 3 [19 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-1 communication	PA-SKILL-211	Long.	-	-	2	2
2	Principles of disease-II	ME-DIS-212	3	2	-	1	3
3	Blood, lymph	ME-HEM-316	3	2	-	1	3
4	Immunology	ME-IMM-216	2	2	-	-	2
5	Head and neck	DE-HAN-214	3	1	-	2	3
6	Oral anatomy, histology and embryology	DE-NAT-224	3	2	-	1	3
7	Respiratory system	DE-RES-222	3	2	-	1	3
			17	11	-	8	19

Examination of longitudinal courses (+re-sits) 1 week

Semester 4 [22 CHs - 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-2- dental services in PHC	DE-SKIL-221	Longit.	-	-	2	2
2	Cardiovascular system	DE-CVS-223	3	2	-	1	3
3	Nervous system and special senses	DE-CNS-225	6	3	1	2	6
4	Endocrine and metabolism	DE-ECDO-215	3	2	1	-	3
5	Gastrointestinal system	DE-GIT- 218	4	2	-	2	4
6	Introduction to medical ethics	ME-ETHIC-226	3	2	--	-	2
7	Introduction to research	ME-REC-227	2	2	-	-	2
			21	13	2	7	22

Examination of longitudinal courses (+re-sits) 1 week

SUMMER 2 AND ELEVTIVE MODULES

1. Research methodology and scientific writing (PA-SUM231) 2 CHs
2. Elective (E232): Visit to dental services in a hospital and write a report 2 CH
3. Repeat courses or examinations for late comers and failures.

SECOND YEAR PROGRAMME EVALUATION

Semester 5 [18 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-3- dental equipments	DE-SKIL-311	Longit.	-	-	2	2
2	Dental pharmacology	DE-PHARM-312	3	3	-	-	3
3	Dental and oral microbiology	DE-MIC-313	4	2	1	1	4
4	Dental materials	DE-MAT-315	4	2	1	1	4
5	Prosthodontics-1	DE-PATH-324	6	2	1	2	5
			17	9	3	6	18

Examination of longitudinal courses (+re-sits) 1 week

Repeat courses or examinations for late comers and failures.

Semester 6 [20 CHs- 22`weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-4- primary dental care	DE-SKIL-321	Longit.	-	-	2	2
2	Forensic Dentistry	DE-LAW-415	2				2
3	Dental and Oral Pathology	DE-PATH-324	7 Longit.	3	-	3	6
4	General Medicine	DE-MED-411	4 Longit.	2	-	2	4
5	General Surgery	DE-SURG-421	4 Longit.	2	--	2	4
			20	9	-	11	20

Examinations (2weeks)

SUMMAR 3 AND ELECTIVES

1. Rural Hospital Residency (DE-SUM-331)2 CHs Block 2 weeks
2. Elective (E332): A 1000 work essay on antimicrobial therapy in dentistry 1CH
3. Repeat courses or examinations for late comers and failures.

THIRD YEAR PROGRAMME EVALUATION

Semster 7 [24 CHs - 25 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Introduction to Conservative Dentistry	DE-CONS-411	Long.	3	-	1	4
2	Introduction to Periodontics	DE-PERIO-412	Longit.	3	-	1	4
3	Introduction to Orthodontics	DE-OMED-413	Longit.	2	-	1	3
4	Introduction to Maxillofacial Surgery	DE-OMFS-414	Longit.	3	-	2	5
5	Introduction to Pedodontics	DE-PEDO-415	Longit.	2	-	1	3
6	Introduction to Prosthodontics	DE-PROS-416	Longit	2	-	1	3
			24	15	-	7	22

Examinations (2weeks)

Semester 8 [24 CHs - 25 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Maxillofacial Surgery	DE-OMFS-421	Longit.	4	1	4	9
2	Conservative Dentistry	DE-CONS-422	Longit.	4	1	4	9
3	Pedodontics	DE-PEDO-423	Longit.	2	1	2	5
			23	10	3	10	23

Examinations (2weeks)

Semester 9 [24 CHs - 25 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Community Dentistry	DE-DPH-511	Longit	2	1	1	4
2	Periodontics	DE-PERIO-512	Longit	3	1	2	6
3	Prosthodontics	DE-PROS-513	Longit.	3	1	4	8
4	Orthodontics	DE-ORTH-514	Longit	2	1	2	5
			23	10	4	9	23

Examinations (2weeks)

Semester 10 [24 CHs - 25 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Dental Radiology	DE-RAD-521	2	2	-	-	2
2	Clinical Rotation	DE-CLIN-522	Longit.	-	6	4	10
3	Comprehensive Dental Training	DE-CDT-523	Longit.	-	4	6	10
			23	2	10	10	22

Examinations (2weeks)

COURSE OUTLINE

Detailed behavioural objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included here

Phase 1 : Semester 1, 2 Preliminary Courses

(University Requirements)

Title	Code	Semester/Duration	Credits
ISLAMIC STUDIES	ISLAM-111+121	1and 2/Longitudinal	2+2

This is a National Requirement compulsory to all Muslim Students, which includes two courses: 111 in Phase 1, and 121 in Phase 2. Their contents are: (1) the recitation of two Suras of the Holy Quran, which introduces a lot of behavioural and ethical issues for mankind as well as for Muslims, (2) the basic sources of religious thought and religious groups, (3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that may arise from emerging issues require ethical discussion, that leads to better understanding between individuals in groups, to help living in a peaceful and constructively safe environment and society.

Most of this content is detailed in the College Notes (NC- 111/05, and (121/06), the rest is obtained by self directed learning and written assignments

Title	Code	Semester/Duration	Credits
ARABIC LANGUAGE	ARAB-112+122	1and 2/Longitudinal	2+2

This is a National Requirement compulsory to all Arab Speaking Students, which includes two courses: 112 in Phase 1, and 122 in Phase 2. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

** Non - Arabic speakers attend a Special Arabic course during the same period, delivered by the concerned dept.

Most of the content is detailed in the College Notes (NC- 112/05, and (122/06), the rest is obtained by self directed learning and written assignments

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE	ENG-113+114	1and 2/Longitudinal	2+2

The sources of health information in the World are still in English. The Internet navigation to obtain information is basically in English. Some of the patients, attending clinics in Sudan, may

only speak English language, especially with open-up of borders with economic development and globalization. Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: (1)correct pronunciation of medical terms, including those related to health services in the country, (2) correct reading and showing understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some pieces from English to Arabic, and three others from Arabic to English, both sets from medical literature.

Most of the content is detailed in the College Notes (NC- 113/05), the rest is achieved by self-directed learning and written assignments

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES 1,2	SUDN-110+120	1and 2/Longitudinal	2+2

This is a National Requirement compulsory to all Students, which includes two courses: 110 + 120 in Semester 1. It includes: (1) the geographic profile of the Sudan, (2) classification of the population and their distribution all over the country, (3) discussion and comparison of the various historical era of the Sudan, (4) main features of Sudanese economy, (5) educational policies and administrative rules in the country, (6) political systems that has governed the Sudan, (7) the legal system, (8) Sudan identity and culture, (9) elements of unity and harmony in social fabric, and (19) issues of diversity and cultural unity.

Most of the content is detailed in the College Notes (Prof. Osama Abdel Rahman Book), the rest is obtained by self-directed learning and written assignments. The coordinators may decide to use other reference that fulfills the objectives.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO DENTISTRY AND MEDICAL EDUCATION	ME-EDU-114	1/Block 3 weeks	2

This is a three-week (2 CHs) block, starting with a simple medical problem that emphasize the meaning and message of health, health care delivery system in the country, the role of the physician in health care, role of other professional and administrative staff, priority health problems, concepts and principles of learning, adult education and learning, student centred and problem-based learning, instructional techniques (lecture, small group etc), student assessment methods, holistic approach, interdisciplinarity and partnership concepts, curriculum development, programme evaluation, leadership and professional ethics. Students are divided to groups to spend a week in a health facility, hospital theatre, hospital outpatient, health centre, various directorates and departments of Federal and State Ministries of Health, etc.. Meanwhile students are given discussion sessions on group dynamics and instructional methods, at the end of the course the groups present their field activity using a suitable audiovisual technique. Evaluation assesses the knowledge and attitudes of the students in these three areas: health system, group dynamics and instructional methods.

Title	Code	Semester/Duration	Credits
PHYSICS FOR MEDICAL EQUIPMENTS AND INVESTIGATIONS	DE-PHYS-115	1/Block 3 weeks	2

The basic principles of general physics are important for understanding certain mechanism that take part in the human body, and also, the technical background of many medical, and dental equipments, and materials used in dentistry, including radiology, imaging, and anesthesia. A medical professional is often confronted with a method of investigation or intervention that is based on simple physical or mechanical process in the human being and he/she has to deal cautiously with the machine and use it correctly considering its proper maintenance and patient's and worker's safety. These include physical chemistry, gas laws, physics of light and sound, and radiation.

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCE -1 &2	COMP-116 COMP-124	1/Block 2 weeks in each Semester	2 each semester

Most of the textbooks of medicine and allied sciences are available on CDs, in which a large volume of knowledge is saved and easily retrievable. There are many software packages demonstrating methods and techniques in clinical skills including patient rapport in history taking, clinical examination, investigations and management. Students and teacher can access the internet for the unlimited sources of health information, both at their professional level and public level for health education. Students and future doctors are educators who have to prepare smart documents and presentations for the health team and profession at large. Knowledge of programmed like Word, Excel, and PowerPoint are indispensable for anyone learner or teacher. Computer is important for students both in the developed or developing world, more so for the latter, who might not have inherited voluminous libraries in their colleges and have to utilize the virtual libraries available all over the world.

Medical journal as hard copies are difficult to be owned by one institution, now almost all are available on-line for those who can use the computer efficiently. The course is intensive focusing on the basic principles of computer electronics and applications relevant to health science education. This is mainly on the hand-on experience in dealing with famous programmed like DOS, Word, Excel, PowerPoint, Access and Internet Explorer.

The use of CDs is stressed covered as well as having e-mails and navigating the internet for health information including how to access medical journals, and communicate with scientists worldwide.

Title	Code	Semester/Duration	Credits
BIOSTATISTICS	ME-STAT-117	Block 2 weeks/1	2

A two-week course basic statistics as applied to health, to include: introduction to statistics, probabilities, data summary, presentation; measurement of central tendency; interpretation of variation (dispersion), population means, normal distribution; confidence interval, frequency distribution, sampling techniques, calculation and interpretation of the concept of confidence inter-

val, the concept of p-value and its interpretation, the normal and skewed frequency distribution of biomedical data, and apply the appropriate test of significance for a given data set and a given research methodology (using t test as an example).

Title	Code	Semester/Duration	Credits
BASIC BIOCHEMISTRY	ME-BIOCH-118	1/Block 3 weeks	2

A three-week block in Semester 1, to include: atomic structure, chemical bonding, chemical reactions, anabolism and catabolism, molecular formulae, solutions and solubility, molarity, molality, normality and molar fraction, acids and bases, buffers, hydrocarbons, isomerism, introduction organic compounds, classification of aliphatic and aromatic hydrocarbons, their properties and reactions; aldehydes and ketones, alcohols, phenols and ethers acids and amines benzenes and their derivatives; carbohydrates, lipids and proteins, vitamins and enzymes and coenzymes, carbohydrates, lipids, proteins, phospholipids, cholesterol, nucleic acids, nitrogen bases, enzymes and co-enzymes.

Title	Code	Semester/Duration	Credits
BEHAVIOURAL SCIENCE	ME-BEHAV-119	1/Block 2 weeks	2

A three-week block during Semester 1, to include: (1) introducing psychology, psychoanalysis, defense mechanism manifesting as behaviours, (2) role of stress in the etiology of physical and psychological illness, (3) coping with loss, grief and death, (4) biological basis of behaviour (catecholamines, dopamine, neurotrasmitters, neuropeptides, (5) cultural considerations in medical practice, (6) family structure and dynamics in health care, (6) health and illness behaviour, (7) personality, (8) terminology of psychiatric disease, (9) medical bases of substance and drug abuse.

Phase 2: Dental science courses

Title	Code	Semester/Duration	Credits
DENTAL MORPHOLOGY	DE-NAT-125	2/ 3 weeks	3

This is a three-week block that details the descriptive anatomy of dentition and the various terms used in dental localization, and function of the individual teeth. The student should: (1) define primary and permanent teeth, (2) discuss the function of the teeth, (3) identify the teeth, and their anatomical locations (in a living subject, cadaver or model) or if presented individually outside the body, (4) describe tooth morphology and nomenclature, (5) recognize the descriptive terms of surfaces and areas in the oral cavity, in relation to the teeth, (6) describe the arrangement of the teeth, (7) define and explain dental anthropology

Title	Code	Semester/Duration	Credits
HUMAN GROWTH AND DEVELOPMENT	ME-GROW-125	1/Block 3 weeks	3

This is a three-week block on general embryology (reproductive organs, gamete formation, fertilization, implantation, organogenesis, and subsequent morphological changes in the human de-

velopment during prenatal, postnatal, childhood, preschool, school age, adolescence, adulthood and elderly (both physical and psychological) changes, teratogens and congenital anomalies. Students should visit an antenatal setup, a labor room, child care centre and growth monitoring charts, milestones, abnormalities of physical growth, maternal and child health care, elderly care. Students become familiar with the special features of all these stages and also gain knowledge about the role of health care providers at the different phases of human life in accordance to the specific needs of each phase. The course is planned to achieve these objectives through the different problems submitted in this block book and tutorials augmented by lab skills and clinical skills tutorials in addition to student interactions with the subject specialists.

Title	Code	Semester/Duration	Credits
MAN AND HIS ENVIRONMENT	ME-ENV-126	1/Block 4 weeks	4

This is a 4-week (4 CHs) course on the inter-relation between Man's internal and external environments, basic concepts of internal physiologic activities, body fluids, acid-base balance, biological membrane, body systems (respiratory, gastrointestinal, nervous etc..) exposed to environment, impact of environment on health, health consequences of exposure to potential environmental hazards (physical, chemical and biological), multidisciplinary approach to environment, the role of the international organizations interested in environmental protection, principles of epidemiology, biological spectrum of environmental diseases, endemic and epidemic diseases.

Title	Code	Semester/Duration	Credits
PROFESSIONAL CLINICAL +SKILLS	ME-SKIL-211+ 221+311+321	3,4,5 &6 / Longitudinal	2 in per semester

This is a two-hour weekly session during semester 3,4,5 and 6 to include: (1) communication skills of speaking, hearing, listening, recognizing strengths and weaknesses of close-ended and open-ended questions, non-verbal communications, establishing rapport, interview and be interviewed, dealing with a difficult patient, (2) dental services in primary health care, (3) dental equipment, and (4) primary dental care and all that requires from taking history and perform examination of the mouth and related parts of the body.

Part of this longitudinal course introduces students to the equipments, materials and supplies in the dental department of a rural hospital. The student should: (1) retain a notebook containing an inventory of all equipments and supplies needed in a primary care dental clinic and in a rural hospital, (2) describe the components of a modern dental chair, and the important electrical and air connections to it, (3) enumerate, and describe each of, the instruments used in dental extraction, (4) enumerate, and outline the uses of each of, the dental material used in filling, prosthetic and orthodontic dentistry, and (5) estimate the amount and cost of material and supplies needed by each patient in a rural setup.

An important component of this course assumes that a student should:(1) obtain information from the Directorate of dentistry in the Ministry of Health, and the national organization of dental practice, (2) review the contribution of health centre in the dental practice, as compares to

the role of hospitals and private clinics, (3) summarize the means of keeping patient records in dental practice centres, (4) list the sorts of problem the patient takes to the dental unit, and the types of managerial choices offered, (5) interview patients about their satisfaction with the service provided, (6) list the sort of equipments, material and supplies used at each level of dental health care, and (7) present a seminar on the above objectives when completed.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF DISEASE AND GENERAL PATHOLOGY-1 &2	ME-DIS-212	3 weeks in Semester 2 & 3 in Semester 3	3 & 3

This is a five-week block on general pathology and microbiology to include: (1)revision of general histology, (2) morphology, classification, staining reactions, and pathogenicity of bacteria, viruses and fungi, (3) sterilization and disinfection, (4) basic concepts in immunity, (5) principles of inheritance, introduction to molecular biology, and genetic defects underlying inherited disorders, (6) general pathology: inflammation: causes, tissue damage and repair, neoplasia and abnormal cell growth, (7) parasites and parasitic diseases, (8) anti-microbial and anti-parasitic drugs.

Title	Code	Semester/Duration	Credits
BLOOD, LYMPH	ME-HEM-316	3 or 5 /3 weeks	3

This is a three-week block on general principles of hematology to include: (1 Hemopoieses, (2) hypochromic anemia and iron overload, (3) megaloblastic and ather macrocytic anemias, (4) hemolytic anemias, (5) genetic disorders of hemoglobin, (6) the white cells, (7) the spleen, (8) hematologic malignancies- acute leukemias, chromic myeloid leukemia, chronic lymphoid leukemia, myelodysplasia, Hodgkin's and non-Hodgkin's lymphomas, multiple myeloma, myeloproliferative disorders, (9) aplastic anemia and bone marrow failure, (10) platelets, blood coagulation and hemostasis, (11) bleeding disorders, (12) coagulation disorders, (13) thrombosis and thrombotic therapy, (14) blood transfusion and (15) pregnancy and neonatal hematology.

Title	Code	Semester/Duration	Credits
IMMUNOLOGY	DE-IMM-216	3 /2 weeks	2

This is a 2- week block course on the structural details of : (1) Anatomy and functional aspects of immune system (2) Molecules involved and the steps of activation in the various immunological reactions (3) Diseases of the immune system in the terms of pathogenesis, clinical presentation and diagnostic methods.

Title	Code	Semester/Duration	Credits
HEAD AND NECK	ME-HAN-214	3 or 4/3weeks	3

This is a three-week-block on the: anatomy of the head and neck. The student should: (1) identify the various parts of the skull bones, particularly the cranial cavity and facial skeleton, including all

sutures and foramina, indicating the structures passing through them, (2) name and locate muscles; their attachments, nerve supply and action, on the skull bones, particularly the muscles of mastication and facial expression, (3) describe the walls, fissures, foramina, notches, and name and identify its contents, particularly the extraocular muscles and nerves, (4) Identify the various parts of the eyeball, and discuss the development, structure and function of each, (5) describe the morphology and structure of the various parts of the nasal cavity and their functions, including the paranasal sinuses (6) review the anatomy and histology of the oral cavity, including the salivary glands (7) describe the triangles of the neck and their contents, particularly lymph nodes and thyroid and parathyroid glands, (8) describe the skeleton and soft tissues of the larynx, its extrinsic and intrinsic muscles and their nerve supply and actions, (9) review the parts of the pharynx, its muscles and nerve supply, and (10) the various parts of the ear and their functions.

Title	Code	Semester/Duration	Credits
ORAL ANATOMY, HISTOLOGY AND EMBRYOLOGY	DE-NAT-224	3 or 4/4 weeks	3

This is a four-week block the includes: the following student objectives: (1) describe the development of the teeth and mouth, as well as that of the branchial arches and their derivatives, (2) outline general anatomy of the head and neck, (3) outline basic anatomy of the thorax, abdomen and extremities, (4) basic anthropology, (5) describe (and recognize under the microscope) the histological features of epithelia, glands, muscles, periosteum, bone cartilage, adipose tissue, fibrous tissue, elastic tissue, lymph tissue, blood and blood vessels, lungs, kidneys, spleen, liver, thymus, pancreas and other endocrine glands.

Title	Code	Semester/Duration	Credits
RESPIRATORY SYSTEM	DE-RES-222	3 or 4 /3 weeks	3

This is a three-week block in Semester 3 or 4 to include: (1) describing the anatomy of the thoracic cage, muscles, diaphragm, upper and lower respiratory tract (including nasal cavity, larynx, trachea, bronchial tree, lungs, pleura), mediastinum, mechanism of respiration, (2) physiological and biochemical bases of normal lung functions and volumes, gas exchange in lung and tissues, gas transfer, (3) pathological and microbiological aspects in airway obstruction, respiratory pathogens, respiratory infections, (4) skills of taking history and performing physical examination to elicit physical signs, prepare a list of differential diagnosis and suggest suitable investigations, (5) given one of the following problems/conditions: pneumonia, foreign body inhalation, bronchial asthma, pleural effusion, pneumothorax, tuberculosis, mediastinal masses, ca bronchus: use basic and clinical sciences to outline diagnostic criteria and management, and show impact on family and community, (6) role of inherited, environmental and occupational factors in respiratory disease, and the effect of respiratory disease on oral health, and consequences of oral disease on respiratory system and function..

Title	Code	Semester/Duration	Credits
CARDIOVASCULAR SYSTEM	DE-CVS-223	3 or 4 /3 weeks	3

This is a three-week-block on the: (1) structure, functions and disorders of the heart and blood vessels, (2) morphology of the heart, its blood supply, various blood vessels, (3) structure of cardiac muscle, (4) contraction of cardiac muscle, (5) electrical activity of the heart and normal ECG tracing, (6) cardiac cycle and cardiac output, (8) blood pressure regulation, hypertension, coronary arteries and ischemic heart disease, (9) rheumatic fever and valvular heart disease, (10) heart failure, (11) essential drugs used in cardiovascular disease, and (12) effects of cardiovascular disease on oral health, and the consequences of oral disease on the cardiovascular system and function.

Title	Code	Semester/Duration	Credits
NERVOUS SYSTEM AND SPECIAL SENSES	DE-CNS-225	3 or 4/6 weeks	6

This is a 6-week- course that covers the basic and clinical sciences of the nervous system including the special senses, all integrated with the necessary skills, around common problems. The content detailed in the comprehensive objectives below includes the anatomy of the central nervous system, peripheral and cranial nerves and plexuses, autonomic nervous system, their histological and developmental features, their functions, common problems, methods of examining the systems, diagnosis, management and prevention, all with vision and consideration for the needs of a practicing denstist.

Title	Code	Semester/Duration	Credits
ENDOCRINE SYSTEM & METABOLISM	DE-ENDO-215	3 or 4/3 weeks	3

This is a three-week- course that covers the basic and clinical aspects of endocrine glands and metabolic. It includes objectives on basic sciences integrated with clinical sciences and skills. It covers the: (1) anatomy, histology, development and secretions of these glands, (2) their functions, (3) diseases occurring as a result of reduced or increased production, (4) diagnostic tests and management, (5) related normal metabolic functions, (5) abnormalities causing disease like diabetes mellitus, their diagnosis, management and preventions of individuals and community, and (7) effect of metabolic and endocrine diseases to dental practice.

Title	Code	Semester/Duration	Credits
GASTROINTESTINAL SYSTEM	DE-GIT-218	or 4/4 weeks 3	4

This is a four-week- course that cover: (1) outline of the structure of the anterior abdominal wall, inguinal region, testes and scrotum, abdominal cavity, gastrointestinal tract (GIT), associated glands (liver, biliary tract, pancreas and spleen including innervations, (2) details of the structural and functional aspects of mastication, deglutition, digestion and absorption of

food, (3) an ideas on gastrointestinal symptoms like nausea, vomiting, diarrhea, constipation, abdominal pain, abdominal distention etc,,(4) outline of common diseases like peptic ulcer, jaundice, infections and infestations, neoplasms, (5) common investigative procedures for GIT disease, (6) common surgical procedures, and (7) drugs used in common GIT disease. In all the above the emphasis should be made on the impact of such system on the knowledge background and activities of the practicing dentist.

Title	Code	Semester/Duration	Credits
MEDICAL ETHICS & PROFESSIONALISM	DE-ETHIC-312/313	4 or 6/2 weeks	2

This course provides an opportunity for students to incorporate ethical principles and professionalism into their student experience. Moreover, the course helps to lay the foundation for our students to develop ethical best practices after graduation. It is divided into two part preclinical & clinical parts. the student should be able to : (1) show an understanding of the history of medicine; before and during the Islamic era, and the role of the Moslem scholars in the practice of medicine, research and medical ethics, (2) discuss the research ethics (3) show clear understanding of the terminology e.g. plagiarism, behavior misconduct…etc (4) Be familiar with the concept of professionalism, interpersonal communication and collaboration with other health care providers (5) manage a death episode, (6) be aware of religious conduct when males are managing female patients and vice versa, (7) discuss the emerging controversy of in-vitro fertilization, transplantation, brain death cloning, genetic engineering, cloning, Students should also understand and be aware of the (8) “Figh” for health preservation including cleanliness, sleep, moderation in eating and drinking, the jurisprudence of toxic substances and narcotics, infectious diseases, breast feeding, consanguity marriage, quarantine, death and funerals, dissection of human body for teaching and law, (9)understand medical behavior, professional ethics, responsibility of a health professional(10) discuss issues in protection of acts of a health professional and (11))be able to give an expert witness at court.

Title	Code	Semester/Duration	Credits
Introduction to Research	DE-REC-227	4 or 6	2

This is a two-week- block, which focuses on the synthesis of professional knowledge, skills, and attitudes in preparation for professional employment and lifelong learning. Students are trained to perform small research projects in one of the dental topics that enable them to collect data, review literature, obtain results and discuss their findings in the form of presentations. The student should: (1) describe research methodology listing elements of research, (2) collect up to date information on a particular topic, using proper sampling techniques (3) execute a small research project and analyze obtained data, (4) discuss the significance of the results obtained and research conclusions, and (5) write down a research paper, and (6) present his findings in front of the class and discusses it with his colleagues and staff.

Title	Code	Semester/Duration	Credits
DENTAL PHARMACOLOGY	DE-PHARM-312	5 or 6/3 weeks	3

This is a four-week-block introduces the students to the general principles of drug use, actions and interactions, particularly those relevant to the practice of dentistry. The student should: (1) describe the sources and nature of drugs, (2) describe the forms, routes of administration of drugs and their absorption, distribution, metabolism and excretion, (3) discuss the factors modifying drug response and the adverse drug effects and interactions, (4) discuss the use of general and local anesthetics, hypnotics, and analgesics, antiseptics, astringents, obtundents, mummifying agents, bleaching agents, styptics, disclosing agents, dentifrices, and mouth washes, and those used in dental conditions, (5) outline the use of the major CNS, cardiovascular, respiratory, endocrine, gastrointestinal, autonomic, renal, chemotherapy, vitamins and hormones.

Title	Code	Semester/Duration	Credits
DENTAL AND ORAL MICROBIOLOGY	DE-MICRO-313	5 or 6/4 weeks	4

This block introduces microbiological sciences to dental students. The student should: (1) describe methods and equipment of sterilization, (2) discuss the causes of infection transmission in dentistry, (3) classify microbiological organisms, (4) describe the common bacterial infections, (5) discuss the etiology, presentations, diagnoses and management of microbiological disorders affecting the oral cavity and teeth.

Title	Code	Semester/Duration	Credits
DENTAL MATERIALS	DE-MAT-213	3 or 5/4 weeks	4

This 3-week-block introduces students to the properties, quality and uses of various types of materials utilized in dental practice. The student should be able to : (1) Enumerate the aims and scope of the science of dental material, (2) Describe the structure and behaviour of all used dental materials. (3)describe the use of gypsum material used in dentistry, (4) describe the nature and use of impression materials, (5) describe the properties and used of synthetic resins, as denture base, restorative and reline material (6)describe the properties and use of metals and alloys, such as dental amalgam, gold foil, gold alloys, stainless steal, chrome and cobalt alloys, (7) describe the properties and use of welding and soldering material, (8) describe the properties and uses of dental porcelain, and porcelain furnace, (9) review the material and instruments used in tooth cutting, abrasive and polishing agents and dye and counter dye materials.

Title	Code	Semester/Duration	Credits
DENTAL AND ORAL PATHOLOGY	DE-PATH-314	5 or 6 /7 weeks	6

This is a longitudinal course during semester 5 and 6 in the third year dentistry. The course introduces the dental students to basic knowledge of oral and maxillofacial diseases, including diseases It provides the student basic concepts of differential diagnosis and treatment of

different oral and dental diseases through discussion of different topics includes:(1) Disorders of development of teeth, bone and soft tissues (2)Dental caries. (3)Disorders of the dental pulp (4)Periapical periodontitis & periapical diseases (4)Cysts of the jaws and oral soft tissues. (5) Odontogenic tumors (6) Biopsy and cytology (7) Connective tissues hyperplasia, neoplasia, and related disorders. (8)Keratoses and related disorders of the oral mucosa. (9)Oral epithelial tumors and melanocytic lesions (10) Bone diseases. (11)Salivary glands disorders and tumors.

Title	Code	Semester/Duration	Credits
COMMUNITY DENTISTRY AND ENTAL PUBLIC HEALTH 1 (ORAL HYGIENE)	DE-HYG-322	9/5 weeks	4

This block is practiced mainly in the community. The student should: (1) identify the ideal health behaviour in dental hygiene, (2) discuss the pathological entities and complications resulting from bad oral hygiene, (3) discuss the health education component of managing the problems of bad oral hygiene, (4) describe the underlying medical diseases or situations that may lead to bad oral hygiene or foul smell, (5) describe the preparations and medicines used in treatment or prevention of lesions caused by bad oral hygiene.

Title	Code	Semester/Duration	Credits
COMMUNITY DENTISTRY AND ENTAL PUBLIC HEALTH 2	DE-COM-323	10/5 weeks	4

This course describes the practice of dentistry in the community. The student should: (1) realize the philosophy of community-orientation and community-based education, (2) apply the principles in (1) to dentistry, (3) incorporate the concept of family health and hygiene when managing a dental problem in one member of that family, (4) list the community practice with and against good oral hygiene, (5) visit the health establishment offering service to the community, and investigate the orientation of the service and the role of community participation, (6) discuss the cost of dental services and the burden of that on the individual, family, employer and state.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO PROSTHODONTICS AND PROSTHODONTICS	DE-PROS-416 513	7, 9	

This is an extended clerkship (12 weeks) in three blocks on the advantages, disadvantages, indications, contraindications and the materials and techniques of fixed and removable prosthodontics. The student should: (1) describe the principles of design and construction of fixed appliances for replacement of missing teeth, (2) describe the preservation, retention, durability, and integrity of crown preparations, including preservation of periodontium, (3) describe ceramic and porcelain fused to metal crowns, (4) follow correctly the steps of preparation: waxing and design of frame, spruing of veneer area and application of porcelain, contouring, staining, glazing and polishing of restoration, (5) restore crown and bridge and describe crown and

bridge failure and repair, (6) describe the fitting and cementation of the fixed prosthodontics, (7) discuss oral hygiene in fixed prosthodontics, (8) diagnose and outline management of patients who require partial of full removable dentures, (9) list the anatomical and other difficulties encountered in denture reconstruction, and (10) insert partial and full removable dentures..

Title	Code	Semester/Duration	Credits
GENERAL MEDICINE	DE-MED-411	6 or 7/4 weeks	4

This is a 4-week continuous clearkship, which is interrupted by longitudinal courses for one half-day every week. During this 12-week clerkship, the student should(1) demonstrate good attitudes, ethics and professional behaviour in the practice of internal medicine (2) obtains full history relevant to the medical problem in general practice, perform appropriate physical examination, requests informative and cost-effective investigations, synthesizes information to reach (or suggest differential) diagnosis, select (or suggest) proper treatment, health promotion, prevention, protection, follow up and rehabilitation, including problems seen in emergency situations, on dental and oral health. (3) outline regnition of epidemic and endemic diseases, common respiratory, cardiovascular, gastrointestinal, renal, endocrine, rheumatic, and nervous system problems, (4) demonstrate knowledge of basic and clinical sciences , relevant to internal medicine and general dental practice practice, (5) recognize urgent and emergency dental and oral conditions, (6) analyze community problems related to medical disease, and (6) essential drugs used in common medical problems(malaria, hypertension, disorders of the motor systems. coronary heart disease, congestive heart failure, arrythmias, pneumonia, asthma, causes of dyspepsia, nephrosis, nephritis and renal failure, diabetes, vomiting diarrhoea, constipation, nutritional deficiencies, anemias, hematological malignancy, bleeding disorders, osteoarthritis, rheumatoid arthritis, SLE, and gout.

Title	Code	Semester/Duration	Credits
GENERAL SURGERY	GENERAL SURGERY	6/4 weeks	4

This is a four-week continuous clearkship, interrupted only by longitudinal courses for one half-day every week, The student should: (1) demonstrate good attitudes, ethics and professional behaviour in the practice of surgery (2) obtain full history relevant to the surgical problem, perform appropriate physical examination, requests informative and cost-effective investigations, synthesizes information to reach (or suggest differential) diagnosis, select (or suggest) proper treatment, health promotion, prevention, protection, follow up and rehabilitation, including problems seen in emergency situations in oral and dental practice, (3) demonstrate knowledge of basic and clinical sciences, particularly anatomy, pathology, microbiology and basic skills, relevant to dental and surgery, (4) recognize urgent and emergency surgical conditions, e.g. burns, acute abdomen, head injury, (5) diagnose and manage (or detail description of management of) goitre and thyroid disorders, acute abdomen, breast lump, , lymphadenopathy, biliary and liver surgical conditions peptic ulcer, chest trauma, (6) outline diagnostic procedures and management of cardiac surgical problems, brain tumors, , (7)describe the anesthetics for preoperative and post-operative management, (7) basic operative skills, (8) essential drugs used in general surgery.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO ORAL AND MAXILLOFACIAL SURGERY AND MAXILLOFACIAL SURGERY	DE-SURG-414-421	7, 8	

This 10-week-clerkship divided into 2 longitudinal to introduce students to the diagnosis and management of oral surgical problems. The student should: (1) state the indications for tooth extraction, (2) evaluate patient fitness for oral surgical procedures, (3) describe the techniques of tooth extraction including transalveolar technique and the use of elevators, (4) describe the complications of extraction and their management, (5) list the acute infections of the oro-facial region, and discuss their etiology, presentation and management, (6) describe the etiology, presentation and management of bone infection in the oro-facial region, cystic lesions of the jaw, precancerous conditions of the oral cavity, facial pain, oro-antral fistulae, odontogenic tumors, benign and malignant tumors, (7) outline the diagnosis and management of orthognastic surgery including craniofacial deformities, and reconstructive surgery of skeletal and soft tissue elements, and (8) show ability to take history, do thorough examination, request appropriate investigantion and carry out patient counseling and advice.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO CONSERVATIVE DENTISTRY AND CONSERVATIVE DENTISTRY	DE-CONS-411- 422	7, 8	

This fourteen-week-clerkship divided into two longitudinal to introduces the student to various restorative skills to a level acceptable to patients and the profession. The student should: (1) define conservative dentistry, (2)review knowledge on dental materials, (3) review knowledge on the etiology, classification, presentation and prevention of dental caries, (4)describe the instruments used in operative dentistry and their use, (5) describe the principles and techniques of cavity preparation, (6) describe the use of various restorative materials: amalgam, dental matrices, their selection and application, (7) discuss the biological bases of restorative dentistry, (8) describe tooth coloured resotorative material, (9) describe the pin-technique and pin-retained restorations, (10) describe the gold foil restorations, (11) describe the intra-coronal wax pattern and cast gold restorations, (12) review the vital aesthetic restorations, and (13) organize records of patient assessment.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO PEDODONTICS AND PEDODONTICDS	DE-PEDO-415-423	7, 8	

This is a clerkship of two longitudinal, which aims at the common dental problems in children. The student should:

(1) follow the development of a child and its dental maturation, including the developmental anomalies of the teeth and jaws (2) list the oral habits of children, (3) list the oral manifestations of infectious and neurologic diseases, (4) outline the dental management of children

with special needs, (5) describe the special arrangements in local anesthesia and tooth extraction in children, (6) outline the indications and procedures of plaque control and topical fluoride therapy, fissure sealants, amalgam and composite restorations in children, stainless steel crowns, pulpal treatment in children, extraction of primary teeth, and space management appliances, and (7) manage oral trauma.

Title	Code	Semester/Duration	Credits
DENTAL RADIOLOGY	DE-RAD-521	LONGITUDINAL	3

This clerkship course provides student with the technical and diagnostic abilities of oral (and related) radiology. The student should: (1) describe the history of radiology and main imaging modalities, (2) describe the physical basis of x-ray production, attenuation and abosorption, (3) explain the techniques of obtaining tomographs and pantomographs, (4) identify major anatomic structures in the routine skull and chest x-rays, (5) produce intra-oral radiographs, and describe their normal radiographic appearance, and that of a pantomograph, (6) identify the normal variations in the shape and number of teeth in x-rays, (7) discuss the radiological diagnosis of dental caries, trauma to teeth and jaw, (8) outline and suggest the radiological diagnosis of periodontal disease, apical and peripheral problems, teeth resorption, oral and peri-oral cysts, dysplastic disease, and benign and malignant tumors.

Title	Code	Semester/Duration	Credits
ORAL MEDICINE	DE-OMED-424	7-8	4

This is longitudinal course that aims at providing students with diagnostic and management knowledge and skills for common oral medical problems. The student should: (1) present for this course a list of objectives encompassing the importance of this subject, (2) discuss the etiology, presentation, diagnosis (including investigations) and management of acute infections of oral and para-oral regions, blood dyscrasias, oral sepsis, temporomandibular joint dysfunction, diseases of salivary glands, facial pain, cysts and tumors of the oral cavity, swelling of the jaw, (2) pay attention to the following diseases when managing a dental problem; blood dyscrasias, cardiac disease, metabolic and endocrine disorders, nutritional deficiencies, thyroid and parathyroid disease, and oral manifestions of vesiculo-bullous lesions(pemphigus, pemphigoid..etc.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO PERI ODENTICS AND PERIODONTICS	DE-PERI-412-512	7, 9	

This longitudinal course provides knowledge on the diseases of periodontium. The student should: (1) describe the anatomy and histology of the periodenium, (2) describe the definition, classification, formation, composition, and diagnosis of dental plaque, (3) describe the definition, classification, formation, effects on gingival and periodontal disease, and diagnosis

of dental calculus, (4) describe the microbiology of dental plaque associated with gingival and periodontal disease, (5) discuss periodentitis, gingivitis, and differentiate between them, (6) oral hygiene as related to gingival and periodontal disease, (7) describe the non-surgical management of periodontal disease, (8) discuss the indications and contra-indications of periodontal surgery, and (9) describe orthodontic management in periodontal disease..

Title	Code	Semester/Duration	Credits
FORENSIC DENTISTRY	DE-LAW-415	6/2 weeks	2

This is a two-week-clerkship which introduces the expanding topic of forensic pathology, using dental and oral evidence in crime detection and identification of victims and suspects. The student should: (1) list the various components of dental structure and function used in forensic pathology, (2) identify individual he/ she encountered in his training on oral observations of shape, size and number of teeth, occlusal pattern and biting marks on the body of the victim or suspect. (3) The student will be introduced to the methods and techniques for age determination.

Title	Code	Semester/Duration	Credits
FORENSIC DENTISTRY	DE-LAW-415	6/2 weeks	2

Title	Code	Semester/Duration	Credits
INTRODUCTION TO ORTHODONTICS AND ORTHODONTICS	DE-ORTHO-413-514	7, 9	

This is a six-week-clerkship, which is mainly about orthodontic problems and their management. The student should: (1) show familiarity with trace cephalometric roentgenograms and space analysis control, (2) fabricate removable fixed appliances for preventive, interceptive and minor corrective procedures, (3) describe the developmental anatomy of skull and occlusion, (4) discuss the etiology, classification and management of malocclusion, (5) describe the anatomy of oral muscles, (6) discuss the principles of impression techniques and model preparation, (7) describe the therapeutic methods of obtaining space, (8) enumerate and list the principles and design of removable and fixed appliances, (9) outline the management of habits of mouth breathing, finger sucking, tongue thrust, and that of abnormal labial frenulum.

During this module the student will be updated with new advancements and fields of dentistry.

Title	Code	Semester/Duration	Credits
COMPREHENSIVE DENTAL CLINICAL TRAINING	DE-CDCT-522	522	9

This is a clinical course that includes continuous modules through semesters 7,8,9,&10 enforce and augment the knowledge acquired by the students during their study. It is composed of a series of clinical sessions to fulfill a comprehensive management for patients. During this module the student will be updated with advancement in all fields of Dentistry.

Title	Code	Semester/Duration	Credits
ASSESSMENT OF PATIENT MANAGEMENT	DE-ASMNG-524	7,8,9 &10	4

Conducting a mini-thesis is a partial fulfillment for the degree of Bachelor of Dentistry, Students are expected to apply theoretical knowledge in research methodology to design their study, decide on the sample, collect and analyze data. Expert supervisors will have regular meeting with the student group over semesters, to monitor the research process. Each group would submit a written thesis and dates for presentation would be specified.

Title	Code	Semester/Duration	Credits
ASSESSMENT OF PRESENTATIONS	DE-ASPRN-525	10/2	2

This is assessment for the student cases management during the clinical semesters presented to experts in all areas of dentistry. Appointment for the presentation will be assigned.

The student will face a panel of External and Internal examines who will evaluate the work..

FACULTY OF

RADIOGRAPHY & MEDICAL IMAGING SCIENCES

UNDERGRADUATE & GRADUATE PROSPECTUS

VISION AND MISSION

The VISION of the Faculty of Radiography and Medical Imaging - National University- Sudan aims to be the most respected of its kind, as evidenced by high quality of premises, up-to-date administration and governance, job- and researchdirected instruction, to produce a very high quality of graduates in their ethical, professional and scholarly contribution.

Its MISSION is to develop the highest standards of academic and technical excellence. The various parts of this programme aim to produce ethically responsible, innovative, critically thinking professionals committed to meeting the imaging technology needs of all communities in the Sudan and the rest of the world, appropriately and efficiently. The curriculum teaches the students how to learn and continue as lifelong learners.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Radiography and Medical Imaging Sciences, has to:

1. Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.
2. Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.
3. Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Radiography and Diagnostic Medical Imaging Sciences.
4. Pay the published fees: 32,000 SDG or US $ 4000 [international students] (2018).

CAREER ADVICE

Students qualified with this Bachelor degree pass through a track decreed by the Health Professions Council, currently reporting to the Minister of Health. They are temporarily accredited as radiology and diagnostic imaging technologists. Grads may pursue master's and doctoral degrees in the fields of radio logic technology to qualify for university teaching staff, work for the industry, or in other specialized areas. The graduate may be interested technologists in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence.

FACULTY OBJECTIVES

The objectives of The Faculty of Radiography and Medical Imaging Sciences of National University are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National University philosophy and message.
2. Graduate qualified technologists in the field of medical imaging technology to satisfy the needs of employment market and development plans.
3. Provide students with theoretical knowledge and practical applications in various aspects of radiological and imaging techniques
4. Qualify students with the technical skills necessary to operate sophisticated diagnostic imaging equipment, as well as those for simple maintenance, and troubleshooting description.
5. Provide knowledge, skills and attitudes needed to administer diagnostic medical imaging units, and satisfy the requirements of quality control.
6. Acquire professional ethics and team-work approach.
7. Provide theoretical and practical information needed for involvement in research, and evidence based imaging.
8. Develop self-education skills that qualify students for further continuous and graduate knowledge acquisition.
9. Contribute to community development through health services provided in its own health institutions and other institutions co-operating with it, through the following: (a) partnership in designing health programmes and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) Contribution in continuous education through short and long term courses, to improve efficiency of health workers, and (c) Provision of essential equipments and supplies to improve quality of services, through partnership with the Ministry of Health.

10. Strengthen medical and health research, making use of the University's accessibility and communication privileges.

CURRICULUM OBJECTIVES [Characteristics of the Radiography graduate]

A graduate of the National University Radiography Curriculum should be able to:

1. Adopt the strategies of the National University-Sudan and abide by its objectives and rules stated in its charter.
2. Observe in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Council for Health Professions), and maintain good and honest relations with his/her patients, their families, his/her colleagues across all sectors involved in health.
3. Appreciate the value of diversity and multi-ethnicity in solving imaging problems with emphatic, humane and fair practice.
4. Demonstrate knowledge of basic sciences (medical physics, anatomy, physiology, biochemistry etc..) needed for the practice of imaging technology.
5. Integrate basic, community and clinical sciences in solving imaging technology problems.
6. Use scientific knowledge in imaging technology and management of imaging units, with full awareness of evidence-based practice.
7. Manage emergency imaging needs, and decide and act properly on cases needing referrals to specialized centres or personnel. Be aware of ambulance and patient transfer facilities and contacts.
8. Accepts to work in all settings according to needs, and act to improve imaging service delivery systems both quantitatively and qualitatively.
9. Encourage community participation and act in recruiting various sectors in defining health and imaging-related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices, and remain accountable to their society.
10. Adhere to "health team" approach, acting as an efficient member, capable of dividing labour and responsibilities among its members, and ensuring both effectiveness and homogeneity among the members.
11. Administer the imaging "unit" or "centre" efficiently according to scientific, medical, statistical, economic and legal bases.
12. Continue to consider elements of efficiency, costing and economic implications in his/her imaging technology choices.
13. Acquire the skills of teaching, learning and communication efficiently to carry out her/his duties in imaging education and in winning the confidence of patients and their families and societies.

14. Acquire the skills of self-learning, and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/her colleagues in the health team.

15. Carry health or imaging-related research, alone or with a health team, using scientific methods known in such activities.

16. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career.

17. Acquire postgraduate qualification in the discipline of his/her choice, recognizing the needs of the society for certain specialties, particularly practice at the level of community,

Feedback to students after mid-course and end of course assessment is an essential part of the Radiography programme

EDUCATIONAL STRATEGIES EDUCATE FLUNAL METHODS

The learning strategies emphasize the following: (1) early acquisition of basic practicl skills-including communication, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problemoriented learning, (4) community-oriented and community-based activities, (5) integration of basic science, community and imsging practice in a multidisciplinary approach, (6) self- and peer education and evaluation, (7) teamwork approach, (8) a wide range of electives, (9) continuous evaluation, (10) preparation for continuous education.

The Faculty of Radiography adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions -once/ week at least, (3) field practice in rural and primary health care settings and societies not less than 1/5th of the timetable, (4) practical sessions (hospitals, health centres, laboratory, technical) not less than 1/4th of the curriculum timetable, (5) skill laboratory (weekly) sessions, (6) lectures -not more than 1/3rd of the curriculum timetable (not more than 3 lectures/day), (7) educational assignments, reports and research activities (as many as the programme and time would allow), (8) electives -about 10% of the curriculum timetable- (about 2 hours/semester).Feedback to sto

TIMETABLE

The college adopts the semester system. Duration of study for the bachelor's degree in radiology (B.Sc. RAD (Honors) is four years divided into eight semesters (3 phases), covering a total of over 160 credit hours. Semesters 1 comprises phase 1- shared with other health specialties. Semester 2, 3 and 4 cover core specialized courses for the B. Sc degrees offered by the college. Semesters 6-8 include clerkship courses mostly spent in imaging units outside the college. A semester is 18-20 weeks in Phase 1 and 2, and 22-24 weeks in Phase 3. There are three compulsory Summar courses and three electives; credit hours of electives are included in the total.

Semester 1 [22 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Arabic language-1	ARAB-112	Long	2	-	-	2
2	English language-1	ME-ENG-113	Long	2	-	-	2
3	Sudanese studies-1	SUDN-110	Long	2	-	-	2
4	Biostatistics	ME-STAT-117	Long	2	-	-	2
5	Islamic studies-1	ISLAM-111	Long	2	-	-	2
6	Islamic studies-2	ISLAM-121	Long	2	-	-	2
7	Arabic language-2	ARAB-122	Long	2	-	-	2
8	Introduction to Medical Ethics	ME-ETHIC-226	Long	1	1	1	2
9	Sudanese studies-2	SUDN-120	Long	2	-	-	2
10	Medical terminology-1	ME-TERM-127	Long	2	-	-	2
11	Human body structure & function (introduc-(tion-anatomy & physiology	PA-NAT-126	Long	-	1	1	2
			16	19	3	3	22

Phase 1:Introductory courses and Faculty requirements = Semesters 1
Phase 2: Integrated basic science organ system courses = Semesters 2-5

Phase 3: Clerkships Semesters 6-8

Semester 2 [22 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Computer science-1	ME-COMP-116	2	2	-	1	2
2	Physics for medical equipment & investigations	ME-PHYS-115	3	2	-	-	2
3	English language-2	ME-ENG-123	Long	2	-	-	2
4	Basic biochemistry	ME-BIOCH-118	3	2	-	1	2
5	Computer science-2	ME-COMP-124	2	2	-	1	2
6	Mathematics and calculus	RAD-CALC-120	2	2	-	-	2
7	Introduction to medical Imaging & Medical Education	ME-EEDU-114	Long	2	-	-	2
8	Musculoskeletal system	RAD-ANAT-223	Long	2	1	2	3
9	Radiation physics	RAD-PHYS-125	3	2	_	-	2
10	Behavioral science	ME-BEHAV-119	Long	2	-	-	2
			16	20	1	5	21

Examination of longitudinal courses (+re-sits) 2 weekS

SUMMAR 1: Medical records and data collection (ME-SUM-131) 2 CHs Elective (E-132): A 1000 -word report on “Internet Sources of Health Sciences” 1CH

FIRSt YEAR PROGRAMME EVALUATION

Semester 3 [21 CHs- 19 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Medical terminology-2	RAD-TERM-215	2	2	-	-	2
2	Radiobiology	RAD-BIO-412	Long.	2	-	-	2
3	Gross anatomy (Regional-1)	RAD-ANAT-212	4	2	1	2	4
4	Introduction to radiography	RAD-RAD-214	2	3	-	-	3
5	Diagnostic imaging equipment-1	RAD-EQUIP-213	2	2	-	1	2
6	Patient care in imaging	RAD-CARE-313	2	3	-	-	3
7	Radiographic technique & procedures-1	RAD-TECH-216	Long.	2	-	1	2
8	Man & environment(Imaging physiology)	ME-MRPHY-311	5	4	1	1	5
9	Professional skill-1 (Nursing	RAD-SKILL-221	2	2	-	-	2
			19	22	2	5	25

Examination of longitudinal courses (+re-sits) 1 week

Semester 4 [21 CHs- 21 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Diagnostic imaging equipment-2	RAD-EQUIP-225	3	3	-	-	3
2	Introduction to radiography-2	RAD-RAD-222	2	2	-	-	2
3	Computer in Medical Imaging	RAD- COMP-314	2	3		-	3
4	Gross anatomy-2 (Regional-2)	RAD-ANAT-223	3	2	-	1	2
5	Radiographic techniques & procedures-2	RAD-TECH-224	Long.	2	-	-	2
6	Nuclear medicine physics & technique(radionu-clide imaging)	RAD-NUCPHY-229	3	2	1	1	3
7	Principles of diseases(Pathology)	ME-DIS-212	5	4	1	1	5
8	Introduction to research	ME-RES-227	Long.	2	-	-	2
			18	20	2	3	22

Examination of longitudinal courses (+re-sits) 1 week

SUMMAR 2: Research methodology and scientific writing (ME-SUM231) 2 CHs Elective (E232): Draw a map of health services in one Multimedia =2 CH

SECOND YEAR PROGRAMME EVALUATION

Semester 5 [18 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Radiographic anatomy	RAD-ANAT-318	Long.	1	-	2	2
2	Special procedures- advanced techniques-1	RAD-ADTEC-317	Long.	2	-	1	2
3	Ultrasound physics	RAD-SON-217	2	2	-	-	2
4	CT physics	RAD-PHYS-222	3	3	-	-	3
5	Cross-sectional anatomy	RAD-ANAT-316	3	2	-	-	3
6	Basic radio-pharmacology	RAD-PHARM-319	3	3	-	-	3
7	Radiographic pathology	RAD-PATH-312	3	2	-	-	2
8	MRI physics	RAD-MRPHYS-311	3	3	1	2	5
9	Quality Assurance	RAD-QA-328	2	2	-	-	2
			19	20	1	5	24

Examination of longitudinal courses (+re-sits) 1 week

000 work essay on management of an emergency 1CH

THIRD YEAR PROGRAMME EVALUATION

Semester 6-8 - Clerkships or Hospital Department Rotations=76 CHs

Four semesters, 16 modules of four major rotation, five longitudinal courses including two elective

#	Rotation Groups	Disciplines (symbol-number)	Credit Hours	Duration (weeks)	Longitudinal Courses
1	A	Multidisciplinary clinical practice clerkship [RAD-CLIN-322,323,324]	6	Long.	
2		Professional skills-2(intervention-Radiology) [RAD-SKILL-311]	2	Long.	
3		CT techniques & Protocols [RAD-CT-TEC-326]	2	2	
4		Ultrasound technique [RAD-SON-325]	3	3	
5		MRI techniques &Protocols [RAD-MRI-327]	2	4	
6		-Advanced technigues-2(Mammography-Dental-Lithotripsy) [RAD-TECH-330]	2	5	
7	B	Radiation Protection [RAD-PR-218]	2	4	
8		Clerkship department rotation [RAD-CLIN-414]	6	Long.	
9		Case studies [RAD-CASE-415]	4	Long.	
10		Radiotherapy [RAD-THER-413]	2	4	
11		Advanced ultrasound techniques (RAD-SONO-416)	3	4	
12		Management of an imaging unit(RAD-MA G-329)	2	4	

#	Rotation Groups	Disciplines (symbol-number)	Credit Hours	Duration (weeks)	Longitudinal Courses
13	C	Films review & interpretation [RAD-REV-424]	4	4	
14		Clerkship department rotation [RAD-CLIN-322, 323,324, 414, 423]	6	Long.	
16		Professional Trip [ELECTIVE]			
17		Graduation project and seminars[RAD-GRAD-421, 422]	6	8	

Rotation of the groups is as follows:

Semester 6 = A B C

Semester 7 = B C A

Semester 8 = C A B

CLERKSHIP EVALUATION AND GRADUATION

COURSE OUTLINE

Detailed behavioral objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included below:

Phase 1: Semester 1, Preliminary Courses

(University Requirements)

Title	*Code*	*Semester/Duration*	*Credits*
ISLAMIC STUDIES	ISLAM-111+121	1and 2/Longitudinal	4+4

This is a National Requirement compulsory to all Muslim Students, which includes two courses: 111 in Phase 1, and 121 in Phase 2. Their contents are: (1) the recitation of two Suras of the Holy Quran, which introduces a lot of behavioural and ethical issues for mankind as well as for Muslims, (2) the basic sources of religious thought and religious groups, (3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that may arise from emerging issues that require ethical discussion, leading to better understanding between individuals in groups, to live in a peaceful and constructively save environment and society..

Title	*Code*	*Semester/Duration*	*Credits*
ARABIC LANGUAGE	ARAB-112+122	1and 2/Longitudinal	4+4

This is a National Requirement compulsory to all Arabic Speaking Students, which includes two courses: 112 in Phase 1, and 122 in Phase 2. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an

Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE	ENG-113+114	1and 2/Longitudinal	4+4

The sources of most health information in the World are in English. The Internet navigation to obtain information is basically in English. Some of the patients, attending clinics in Sudan, may only speak English language, especially with open-up of borders with economic development and of globalization. Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: (1)correct pronunciation of medical terms, (2) correct reading and understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some pieces from English to Arabic, and others from Arabic to English, both from medical literature.

Most of the content is detailed in the College Notes (NC- 113/05), the rest is achieved by self-directed learning and written assignments. The coordinators may decide to use other reference that fulfills the objectives.

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES 1,2	SUDANESE STUDIES 1,2	1and 2/Longitudinal	4+4

This is a National Requirement compulsory to all Students, which includes two courses: 110 in Semester 1, and 120 in Semes 2. It includes: (1)the geographic profile of the Sudan, (2) classification of the population and their distribution all over the country, (3) discussion and comparison of the various historical era of the Sudan, (4) main features of Sudanese economy, (5) educational policies and administrative rules in the country, (6) political systems that has governed the Sudan, (7) the legal system, (8) Sudan identity and culture, (9) elements of unity and harmony in social fabric, and (19) issues of diversity and cultural unity.

Title	Code	Semester/Duration	Credits
BIOSTATISTICS	STAT-117	1/Block 2 weeks	2

A two-week module on basic statistics as applied to health, to include: (1) introduction to statistics, (2) probabilities, (3) data summary, (4) presentation; measurement of central tendency; interpretation of variation (dispersion), (5) population means, (6) normal distribution; confidence interval, (7) frequency distribution, (8) sampling techniques, (9) calculation and interpretation of the concept of confidence interval, (10) the concept of p-value and its interpretation, (11) the normal and skewed frequency distribution of biomedical data, and (12) how to apply the appropriate test of significance for a given data set and a given research methodology (using t test as an example).

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCE-1&2	COMP-116-124	1/Block 3 weeks	2

This is a 3-week block that introduces the following facts: The course is intensive focusing on the basic principles of (1) computer electronics and applications relevant to health science education, (2) hand-on experience in dealing with famous programme like DOS, Word, Excel, PowerPoint, Access and Internet Explorer, (3) the use of CDs is extensively covered as well as having e-mails and navigating the internet for health information, (4) how to access medical journals, and communicate with scientists worldwide.

Title	Code	Semester/Duration	Credits
PHYSICS FOR MEDICAL EQUIPMENTS AND INVESTIGATIONS (MEDICAL PHYSICS)	PHYS-115	1/Block 3 weeks	2

The basic principles of general physics are important for understanding certain mechanism that takes part in the human body, and also, the technical background of medical equipment. A medical professional is often confronted with method of investigation or intervention that is based on simply physical or mechanical process in the human being and he/or she has to deal cautiously with the machine and use it correctly considering its proper maintenance, the safety of patient's and workers, these include physical chemistry, gas law, and radiation. The details of the contents include: (1) structure of physics principal. (2) Physical quantities in their correct international system (SI) units. (3) Explanation and derivatives of units, and the dimensions of any quantity. (4) Systematic and random uncertainties and calculation of the uncertainty in experiment. (5) Plan an experiment for reliable reading and use of graphs accurately. (6) State and use Bayle's gas law. (7) Usage of the universal gas law equation for an ideal application. (8) Kinetic theory for gases and their application. (9) Relate the kinetic energy of molecule to the temperature. (10) Physical principles of light, waves, wave's production and propagation, as applied to ophthalmic optics and vision as well as describe the wave types and the wave's motion. (11) Physical principles of sound waves and their types, reflection and refraction, graphical representation and beats as well, and their relationship and uses in medical instruments. (12) Definition and use of the term frequency, period, wavelength, and amplitude when applied to progressive waves. (13) Relate the frequency and wavelength to the velocity of the wave. (14) Distinguish between transverse and longitudinal waves. (15) Physical principle of radiation with particular emphasis on production of **x-**ray and its interaction with material. (16) bio-fluid mechanics, pressure and blood pressure in human body. (17) Physical principle of radioactivity and radioactive decay. (18) Uses of radioactivity particularly in medical treatment and investigations. (19) Different diagnostic instruments. (20) Physics concept of radiotherapy and nuclear medicine.

Most of the content is detailed in the College Notes (NC- 115/05), the rest is achieved by self-directed learning and written assignments. The coordinators may decide to use other reference that fulfills the objectives.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICINE AND MEDICAL EDUCATION	ME-EDU-114	1/Block 3 weeks	2

This is a three-week (2 CHs) block, starting with a simple medical problem that emphasize: (1) the meaning and message of health and health care delivery system in the country, (2) the role of the physician in, other professional and administrative staff in health care, (3) priority health problems, (4) concepts and principles of learning, (5) adult education and learning, (6) student centred learning, (7) problem-based learning, (8) instructional techniques (lecture, small group etc), student assessment methods, (9) holistic approach, interdisciplinarity and partnership concepts, (10) curriculum development, (11) programme evaluation, (12) leadership and (13) professional ethics. Students are divided into groups to spend a week in a health facility, hospital theatre, hospital outpatient, health centre, various directorates and departments of Federal and State Ministries of Health, etc.. Meanwhile students are given discussion sessions on group dynamics and instructional methods, at the end of the course the groups present their field activity using a suitable audiovisual technique. Evaluation assesses the knowledge and attitudes of the students in these three areas: health system, group dynamics and instructional methods.

Most of the content is detailed in the College Notes (NC- 114/05), the rest is achieved by self-directed learning and written assignments. The coordinators may decide to use other reference that fulfills the objectives.

Title	Code	Semester/Duration	Credits
BASIC BIOCHEMISTRY	BIOCH-118	1/Block 3 weeks	3

A three-week block in Semester 1, to include: (1) atomic structure, (2) chemical bonding, (3) chemical reactions, (4) anabolism and catabolism, (5) molecular formulae, (6) solutions and solubility, (7) molarity and molality, (8) normality and molar fraction, (9) acids and bases, (10) buffers, (11) hydrocarbons, (12) isomerism, (13) introduction to organic compounds, (14) classification of aliphatic and aromatic hydrocarbons, their properties and reactions; (15) aldehydes and ketones, alcohols, phenols and ethers acids and amines, benzenes and their derivatives; (16) carbohydrates, (17) lipids, (18) proteins, (19) vitamins, (20) enzymes and coenzymes, (21) phospholipids, (22) cholesterols, (23) nucleic acids, (24) nitrogen bases.

Most of the content is detailed in the College Notes (NC- 118/05), and in the practical notes. The rest is achieved by selfdirected learning and written assignments. The coordinators may decide to use other reference that fulfills the objectives.

Phase 2: Semesters 2-5, Organ System Courses

Islamic studies (ISLAM-121) - 4 CHs longitudinal (See ISLAM-111).

Arabic language (ARAB-122) - 4 CHs, longitudinal (See ARAB-112)

English language (ENG-123) -4 CHs longitudinal (See ENG-113)

Computer (COMP-124)- 2 CHs Block

Title	Code	Semester/Duration	Credits
RADIATION PHYSIC	RAD-125	1/Block 3 weeks	3

This is a three-week-block detailing the physical aspects of all forms of ionizing and non-ionizing radiation, and start on the basics of radiation physics which include (!) structure of the atom (2) rations from the atoms (3) ionizing radiation (4)electromagnetic effect (5) x-rays and radio activity (6)nuclear characteristics (7) production of electromagnetic waves (8) interactin different types of radiations with matter and living cells (9)particular emphasis on diagnostic and thlerapeutic x-rays, nuclear ctionmedicine, ultrasound, CT and MRI. More detailed and specialized courses on the physics of each modality will follow.

Title	Code	Semester/Duration	Credits
HUMAN BODY STRUCTURE AND FUNCTION	PA-NAT-126	2/Block 4weeks	4

Upon the successful completion of this course the student will be able to describe and explain, at a basic level, the gross anatomy and introductory histology of the human body, especially the functional aspects of major tissues, organs, and systems including respiratory, cardiovascular, digestive, urinary, reproductive, endocrine and nervous with special emphasis on the interaction between these system and the major failures producing disease. More details are needed in neurobiology. There are some formal laboratory sessions. However a selfdirected optional human anatomy laboratory is running all the time for independent study.

It also includes fundamentals of mammalian physiology in a systematic pattern: function of the nervous system (neurotransmitter, sensory and motor systems), endocrine gland and their secretions, bone and muscle physiology, cardiovascular, respiratory systems, gastrointestinal and renal physiology.

In addition it includes the characteristics, features and functions of neurons, ganglia, synapses, neuroeffector autonomic nervous system and somatic reflex arch. The concepts, definitions, processes and mechanism of membrane potentials, somatic and autonomic transmission, receptor activation and production of response. The structure, organization and regulation of adrenergic and cholinergic systems. Mechanisms (pathophysiology) of diseases related to cholinergic sustem (e.g. myasthenis gravis, periopheral neuropathy and diarrhea) and adrenergic system (e.g hypotension, pheochromocytoma and asthma). Introduction to drugs affecting the autonomic system, their mechanism of action, metabolism, side effects, structure-activity relationships and clinical applications.

Title	Code	Semester/Duration	Credits
MAN AND HIS ENVIRONMENT (PHYS IOLOGY)	ME-ENV-126	1/Block 5weeks	4

This is a 6-week-ccourse on the inter-relation between Man's internal and external environments, basic concepts of internal physiologic activities, body fluids, acid-base balance, biological mem-

brane, body systems (respiratory, gastrointestinal, nervous etc..) exposed to environment, impact of environment on health, health consequences of exposure to potential environmental hazards (physical, chemical and biological), multi-disciplinary approach to environment, the role of the international organizations interested in environmental protection, principles of epidemiology, biological spectrum of environmental diseases, endemic and epidemic diseases.

Most of the content is detailed in the College Notes (NC- 126/06- Sections 1,2, and 3), the rest is achieved by self-directed learning and written assignments.

Title	Code	Semester/Duration	Credits
IMAGING ANATOMY-1 & 2 (GROSS ANATOMY-REGIONAL)	RAD-ANAT-211 RAD-ANAT-223	3/6 weeks 4/6 weeks	5 4

This is a six-week-block consisting of the following topics: (1) human skeleton, bones, joints, muscles and nerve supply and actions of the muscular system, (2) systemic anatomy of the cardiovascular, respiratory, gastrointestinal, abdominal wall, urinary, reproductive, endocrine and CNS, (3) emphasis on structures readily identifiable in images for image quality and orientation, or frequently investigated for disease, (4) identifying anatomic structure in routine and special radiographic images, ultrasound images, and in cross- transverse, sagittal and coronal images in CT and MRI

Title	Code	Semester/Duration	Credits
PRINCIPLES OF DISEASE (PATHOLOGY)	ME-DIS-212	3/5 weeks	4

This is a five-week block on general pathology and microbiology to include: (1) general histology, (2) morphology, classification, staining reactions, and pathogenicity of bacteria, viruses, fungi, (3) sterilization and disinfection, (4) basic concepts in immunity, (5) principles of inheritance, introduction to molecular biology, and genetic defects underlying inherited disorders, (6) general pathology of inflammation, neoplasia and abnormal cell growth, (7) parasites and parasitic diseases, (8) systemic pathology in brief.

Title	Code	Semester/Duration	Credits
DIAGNOSTIC IMAGING EQUIPMENTS-1 &2	RAD-213 and RAD-225	3/2 weeks 4/4 weeks	2 4

This is a two-week-block which introduces the student to the basic electrical and electronic principles required for diagnostic medical imaging equipment and machinery. It helps students to operate basic radiographic equipment effectively Define radiographic equipment. The student should: (1) describe types of electrical supplies, high tension cables and feeder, (2) define line voltage drop and describe distribution of electrical energy, (3) name types of X ray generators and describe voltage wave forms, falling load principle and constant potential generators, (4) differentiate be-

tween fixed anode and rotating anode types, (5) describe the filament circuit and control of the tube current, (6) define exposure time and describe exposure switching, (7) describe beam centring and devices used for beam centring, (8) mention how to control scatter radiation, (9) list fluoroscopic equipment and describe fluorescent screen and fluoroscopic table, (10) describe methods of image intensification, and (11) list equipment for rapid serial radiography, equipment for cranial and dental radiography and mammography equipment, (12) Care and Maintenance of X-Ray equipment, (13) The student should acquaint themselves with the ultrasound, CT, MRI and Gamma Camera, and the instruments in support of these modalities (details to follow in the clerkships).

Title	Code	Semester/Duration	Credits
INTRODUCTION TO RADIOGRAPHY 1&2	RAD-214-228	3/5weeks	4

This is a five-week-block, which includes the historical development of radiography, an introduction to medical terminology pertinent to radiology, ethical and legal issues of health care professionals, and an orientation to the programme and the health care system in relation to medical imaging. Patient assessment, infection control procedures, emergency and safety procedures, communication and patient interaction skills, and basic pharmacology and basic radiation protection are also included. The student has to (1) describe theoretical basis of radiography, (2) outline radionuclide imaging techniques, (3) describe principles of radiophotography, (4) describe and apply image recording techniques currently employed in diagnostic radiology and nuclear medicine, (5) define X ray tube and describe how X ray is generated, (6) define geometry of thickness, wavelength of beam and composition of object transmission, (7) list and operate radiological equipment common encountered in radiology units, (8) describe radiographic processing area (9) Differentiate between film type/screen, (10) Differentiate between imaging modalities in radiology, (11) Process x-ray film manually and atomically (12) Perform darkroom conditions state.

Title	Code	Semester/Duration	Credits
ULTRASOUND PHYSICS	RAD-SONO-217	5/2 weeks	2

This is a two-week-block that course covers general physical principle of the various types ultrasound devices in medicine and for imaging. It also enables students perform examination of the different organs and systems of the body by ultrasound technology. The student should: (1) mention principles of sound wave generation, reflection and absorption, (2) name physical and biological effects and hazards of ultrasound waves, (3) describe various types of waves, (4) define Doppler colour and describe its effects, (5) describe the process of generation of ultrasound signals, (6) name various types of ultrasound wave generating equipment and describe operational principles of each, (7) name the various types of ultrasound examinations and read and outline routine of interpreting results, (8) utilize ultrasound machines for obstetrical and gynecological diagnostic procedures, (9) outline use ultrasound equipment for diagnostic procedures pertinent to the liver, biliary system, GIT and urinary system, (10) outline use ultrasound technique for biopsy sampling for visceral and endocrine organs, (11) describe how colour Doppler flow technique is performed, and (12) list limitations of US techniques and name alternative diagnostic techniques.

Title	Code	Semester/Duration	Credits
PROFESSIONAL CLINICAL SKILLS	ME- SKIL-221+311+321	4,5 &6/ Longitudinal	2 each semester

This is a two-hour weekly session during semester 3, The student should: (1) Describe renal intervention procedure biopsy removal, (2) List and identify instruments needed for renal biopsy (3) Describe intervention procedure regarding GIT and solid, (4) Describe CT guided biopsy on abdomen organs example liver, (5) Describe Ultra-sound guided biopsy on abdomen organs, (7) List instrument require for fine needle and core biopsy, (8) Identify and compare results from fine needle and core needle biopsies, (9) Describe fistulograms and sinogram procedures, (10) Describe the procedure for mylogram and CT mylography, (11) Describe the procedure for histosalpingogram, (12) List and identify instrument needed for HSG, (13) List indication for HSG Describe the procedure for thyroid biopsy, (14) Describe the procedure for breast biopsy using MRI guided needle, (15) Describe the procedure for breast biopsy using ultrasound guided needle, (16) List indication for breast biopsy (17) Describe coronary angiography procedures using conventional cathlap,CTA,MRA, (19) Compare between angio procedures done by,Cathlab,CT and MR, (20) Describe cerebral angiography, (21) List risks and hazards associated with all intervention procedures

Title	Code	Semester/Duration	Credits
PHYSICS FOR COMPUTED TOMOGRAPY	RAD-222	4/2 weeks	2

This is a two-week- block that describe the physical principles of CT images. The student should: (1) describe the methods of attenuation measurement, (2) describe the single detector rotation-translation (first generation) scanners, the multidetector (2nd generation) scanners, rotation scanners with movable detectors (third generation), rotation system with stationary detectors (4th generation), (3) define the volume element, (4) define the density value, (5) describe the partial volume effect.and types of artefacts (6) know the principles of spiral and helical CT scanners and single slice and multislice spiral scanners

Title	Code	Semester/Duration	Credits
RADIOGRAPHIC TECHNIQUES AND PROCEDURES 1&2	RAD-224	4/6 weeks	6

This is a six-week-block that includes an introduction to radiographic positioning terminology, the proper manipulation of equipment, positioning and alignment of the anatomical structure and equipment, and evaluation of X ray images for proper demonstration of basic anatomy and related pathology. The student should: (1) outline parts of the human body subject radiographic imaging in X-ray units, (2) list steps of basic positions of skull radiography, (3) mention steps special positions of skull radiography, (4) list steps of radiography of the mandible and facial bones, (5) list steps of radiography of the shoulder upper limb, wrist and hand, (6) list steps of radiography of the hip, lower limb and knee, (7) list steps of radiography of the foot, (8) list

steps of radiography of the chest, ribs and sternum, (9) list steps of radiography of the pelvis, (10) list steps of radiography of various parts of the vertebral column, (11) show skill in preparation of X-ray films for the locomotor system, chest, skull and facial bones, and (12) write reports on techniques done or attended and compile them into booklets.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICAL ETHICS	RAD-226	4/2weeks	2

The student should show an understanding of the (1) history of medicine; before and during the Islamic era, (2) the role of the Moslem scholars in the practice of medicine, research and medical ethics, (3) the milestones of medical education in the Islamic era, (4) the Fiqh of illness and the sick, the religious regulations concerning treating the sick person, how does the sick person performs his rituals: cleanliness, prayers, fasting, pilgrimage? Also, (5) the visiting of sick person, (6) managing a death episode, (7) the religious conduct when males are managing female disease and vice versa, (8) the emerging controversialities of vitro fertilization, transplantation, brain death, cloning, genetic engineering. Students should be aware of the (9) Figh of health preservation including cleanliness, sleep, moderation in eating and drinking, the jurisprudence of toxic substances and narcostics, infectious diseases, breast feeding, consanguity marriage, quarantine, death and funerals, dissection of human body for teaching and law, (10) medical behaviour, professional ethics, responsibility of a health professional, (11) issues in protection of acts of a health professional and (12) giving an expert witness at court.

Title	Code	Semester/Duration	Credits
RESEARCH METHODOLOGY AND SCIENTIFIC WRITING	ME-SUM-231	4/2weeks	2

This is a two-week- block, which focuses on the synthesis of professional knowledge, skills, and attitudes in preparation for professional employment and lifelong learning. Students are trained to perform small research projects in one of the radiology topics that enable them to collect data, review literature, obtain results and discuss their findings in the form of presentations. The student should: (1) describe research methodology listing elements of research, (2) collect up to date information on a particular topic, using proper sampling techniques (3) execute a small research project and analyze obtained data, (4) discuss the significance of the results obtained and research conclusions, and (5) write down a research paper, and (6) present his findings in front of the class and discusses it with his colleagues and staff.

Title	Code	Semester/Duration	Credits
RADIOGRAPHIC PATHOLOGY	RAD-312	5/4weeks	4

This is a four-week- block that covers pathologic lesions and terminology pertinent to traditional radiology, CT, ultrasound and MRI. It describes characteristics of pathological lesions as seen by various radiographic imaging procedures and relates their features with diagnosis. The

course also aims at strengthening relations between radiology technologic specialists and physicians. The student should outline the pathological features affecting the GIT, Liver & biliary system bones respiratory, cardiovascular, genitor-urinary and nervous systems.

Title	Code	Semester/Duration	Credits
PATIENT CARE AND ETHICS	RAD-313	5/2weeks	2

This is a two-week-block that provides students with basic concept patient care, including considerations for psychological and physical needs of the patient and family. Routine and emergency patient care procedures should be described to the patient. The course also covers the role radiographer in patient education. The student should: (1) employ interpersonal skills to alleviate patient fears, (2) discuss responsibilities of the radiographer towards the patient, (3) discuss the scope of practice of the radiographer, (4) discuss personal, emotional and ethical aspects of death, (5) describe support mechanisms available to the terminally ill, (6) mention methods of determining the proper patient identification, (7) interact with patient family members and friends, (8) demonstrate methods assessment of the vital signs, (9) explain use of auxillary equipment, immobilization devices and communication systems, (10) alleviate patient fears by explaining length, positioning and other aspects of the procedure, and (11) employ general safety precautions and describe specific patient safety measures and concerns.

Title	Code	Semester/Duration	Credits
COMPUTER IN MEDICAL IMAGING	RAD-COMP-314	5/2weeks	2

This is a two-week- block that provides information necessary for understanding of the basic concepts of computer systems and microprocessors and the utilization and application of computer in medical imaging, radiation dose calculation and distribution, record keeping, appointment systems, and building stock-keeping. The student should: (1) outline use of computer hardware and software in medical imaging, (2) apply computer technology for patient data management system Utilize quality assurance data representation, (3) utilize computer for acquisition of data in CT, nuclear medicine radiotherapy, digital radio-imaging, and other forms of radiobiological apparatus, and (4) utilize quality assurance data representation.

Title	Code	Semester/Duration	Credits
RADIONUCLIDE IMAGING(NUCLEAR MEDCINE PHYSICS&TECHNIQUES)	RAD-315	5/2weeks	2

This is a two-week-block reviewing the na&tural radioactivity and the radionuclide used in the medical profession. The student should: (1) name the radioactive material used in imaging, the methods of preparation, precautions and indications, (2) describe the scintillation camera, SPECT, PET, (3) list the uses of Gallium scintigraphy, indications of bone and brain scintigraphy, (4) describe the indications and findings of scintigraphy of the thyroid, lung, heart, liver and GIT and kidneys.

Title	Code	Semester/Duration	Credits
CROSS-SECTIONAL ANATOMY	RAD-ANAT-316	5/4weeks	4

This is a two-week- block. This course provides adequate information on the anatomy of the various parts of the human body at various levels of cross, coronal and sagittal sections, and relates such information to tomography. The course content includes essentials information necessary for students to understand the anatomy of the body that particularly relates to diagnostic imaging, nuclear medicine and ultrasonography. Students are trained to depict locations of the various internal organs on the basis of surface anatomy and appearance in diagnostic images. Students are taught to identify various pathological changes identifiable by tomography.

Title	Code	Semester/Duration	Credits
BASIC AND RADIO-PHARMACOLOGY	RAD-PHARM-319	6/2weeks	

This is a two-week- block that discusses drugs and medicaments commonly prescribed for patients of X ray units and address indications, contraindications, side effects, and their pharmodynamics and pharmokinetics. The course also addresses radiochemistry and its utilization in nuclear medicine. The student should: (1) evaluate patient's illness and recognize drugs and therapies used and define significance of radiological procedures, (2) suggest appropriate plan needed for the imaging procedure required for each patient, (3) provide adequate drugs and medicament needed and register them in an appropriate way, (4) evaluate patients conditions, before, during and after the imaging procedure, (5) list rules and regulations governing drug policies in relation to radiological procedures, (6) describe thermal neutron reactors, cyclotron and fission and equilibrium within the generator system, (7) calculate conversion of units used in radiopharmacy, (8) describe the labeling process in radiopharmaceutical preparations and identify proper methodologies in kit preparation, and (9) calculate the correct concentration, activity and dose using the decay formula.

Title	Code	Semester/Duration	Credits
RURAL HOSPITAL RESIDENCY	RAD-SUM-331	6/2weeks	2

This is a two-week- block in the Summer following Semester 6, to be spent in a rural hospital as near as possible to the student's residence. A log book containing the basic radiological skills should be signed by the supervisor in the rural hospital. A confidential report should be filed mentioning the ethical and social commitment of the student during his residency.

Title	Code	Semester/Duration	Credits
ADVANCED TECHNIQUES AND PROCEDURES 1&2&3	RAD-317-330411	4/6 weeks	6

This is a six-week-block that includes an introduction to radiographic advanced procedures and special investigation,ivu, Ba studies of swallow meal enema, and sailogram, angiography and catheter lab and interventional procedures and CT guided and U/S biopsy and FNA,positioning terminology, the proper manipulation of equipment, positioning and alignment of the anatomical structure and equipment, and evaluation of X ray images for proper demonstration basic anatomy and related pathology. The student should: (1) outline parts of the human body subject radiographic imaging in X-ray units, ((2) show skill in preparation of X-ray film and patient and tray and contrast media for special investigations (3) write reports on techniques done or attended and compile them into booklets.

Title	Code	Semester/Duration	Credits
RADIOBIOLOGY AND PROTECTION	RAD-SUM-218-412	6/2weeks	2

This is a two-week- block, which addresses biological hazards of radiology in various aspects of medicine and biology focusing methods of protection of radiology staff and patients from radiation hazards, influence of radiation in the laboratory and hospital environment. It also covers procedures to be followed in cases of radiological exposure emergencies and accidents. The student should: (1) define various radiological terms (radiological safety organization, maximum permissible dose MPD, shielding, monitoring, and radiation record), (2) mention hazards of radiation and general actions of ionization, (3) depict accidents that could occur in radiological units and other medical or research facilities that utilize radiation, (4) describe biologic damage, (5) explain how radiation dangers are avoided and name methods adopted to minimize such effects, (6) take appropriate action in cases of radiation, (7) describe effects of radiation on matter, (8) explain adverse effects of radiation on living organisms, (9) mention regulations and rules governing restricted areas, (10) mention the significance of continuous scanning and surveillance for such areas, (11) name necessary investigations needed for persons overexposed to ionized radiation, (12) explain safeguards against hazards and future safe utilization radiation in nuclear medicine, (13) explain safe handling of radioisotopes and appropriate methods used for handling waste, (14)mention safeguards against electrical accidents, and (15) list safety measures adopted for radiology.

Title	Code	Semester/Duration	Credits
RADIOTHERAPY	RAD-412	6, 7 or 8/2weeks	2

This is a two-week-clerkship that enables students to acquire the necessary skills in clinical situations that qualify them to participate in basic treatment techniques of radiotherapy and nuclear medicine. The course covers the physical basis of nuclear medicine. It helps students to operate equipment needed for nuclear medicine and understand physical basis of machine operation. It also addresses precautions and patient and staff safety measures to be taken in nuclear medicine. The student should: (1) define radiotherapy and nuclear medicine, (2)describe positioning for major radiotherapy and radionuclear procedures, (3) operate the different types of radionuclear equipment, outline their mechanism of operation, and take safety measures needed for oper-

ation of each equipment, (4) describe various types of radioisotope generators, (5) describe principle of isotope production, (6) describe stages of radioactive isotope disintegration, (7) outline the process of radioimmunoassay and describe the mode of action of radiopharmaceuticals, (8) perform image and data capturing, display and discuss the theoretical basis of such operations and their utilization in nuclear medicine, (9) define the computerized gamma camera system and list its properties, (10) project images on monitors, (11) attend operation and discuss mechanism of action of the various components of nuclear medicine computers, (12) define gamma camera interface, (13) compare analog differentiation to digital differentiation, and (14) discuss principles of image projection, colour and depth of picture.

Title	Code	Semester/Duration	Credits
ABDOMEN AND ALIMENTARY TRACT IMAGING	RAD-322	6,7 or 8/8weeks	8

This is a eight-week-clerkship that enables students to acquire the necessary skills needed in clinical the situation and qualifies them to participate in undertaking basic and special procedures for the abdomen and gastrointestinal tract (GIT) with or without contrast media, fluoroscopy. The course covers anatomy, pathology and physiology of GIT, examination of the esophagus, stomach, intestines, liver, gall bladder, bile ducts, pancreas and spleen, as well as nuclear medicine procedures for GIT and the hepatobiliary system, and applications of various imaging modalities specific for the system. The student should: (1) Describe anatomy and physiology of the GIT and hepatobiliary system, (2) list major pathological lesions of GIT and hepatobiliary system, (3) evaluate condition of a GIT and hepatobiliary system patient and mention precautions to be taken before the procedures, (4) prepare the patient for the procedure, execute the procedure and describe patient management after the procedure, (5) list indications, contraindications and complications of each procedures and mention methods of dealing with each complication, (6) name contrast media and radiochemical needed specifically needed for imaging modalities applicable to the system and mention the mechanism of their action, complication; and methods of avoiding or alleviating those complications, (7) perform plain abdomen radiographs, contrast GIT examination with fluoroscopic control, (8) list advantages and disadvantages of the single contrast examination by barium sulphate, (9) perform double contrast examination of the stomach and colon, (10) perform ultrasound and MRI/CT for GIT, liver and the spleen, (11) describe endoscopic retrograde cholangiopancreatography, oral cholcystography and percutaneous transhepatic cholangiography, (12) describe preparations for imaging during gastroscopy, sigmoidoscopy, colonscopy and barium enema, and (13) write reports on technological aspects of imaging procedures.

Title	Code	Semester/Duration	Credits
CHEST AND RESPIRATORY SYSTEM IMAGING	RAD-323	6,7 or 8/6weeks	6

This is a six-week-clerkship that enables students to acquire the necessary skills needed in clinical the situation and qualifies them to participate in undertaking basic and special proce-

dures for the chest and respiratory system with or without contrast media, fluoroscopy. The course covers anatomy, pathology and physiology of respiratory system, examination of the larynx, trachea, lung, pleura and chest wall. It also addresses nuclear medicine procedures for chest and respiratory system, and applications of various imaging modalities specific for both. The student should: (1) describe anatomy and physiology of the respiratory system, (2) list major pathological lesions of respiratory system seen in chest images, (3) evaluate condition of a respiratory system patient and mention precautions to be taken before the procedures, (4) prepare the patient for the procedure, execute the procedure and describe patient management after the procedure, (5) list indications, contraindications and complications of each procedures and mention methods of dealing with each complication, (6) name contrast media and radiochemical needed specifically needed for imaging modalities applicable to the system and mention the mechanism of their action, complication; and methods of avoiding or alleviating those complications, (7) perform plain chest radiographs, contrast respiratory examination with fluoroscopic control, (8) mention disadvantages of chest fluoroscopy as compared to chest CT, (9) perform ultrasound and MRI/CT for chest and respiratory system, (10) describe the technical preparation and procedures for bronchography, radionuclide lung scanning, pulmonary angiography, and (11) write reports on the procedures on this system.

Title	Code	Semester/Duration	Credits
CARDIOVASCULAR SYSTEM IMAGING	RAD-324	6,7 or 8/4 weeks	4

This is a four-week-clerkship that enables students to acquire the necessary skills needed in clinical the situation and qualifies them to participate in undertaking basic and special projections for the cardiovascular system with or without contrast media, fluoroscopy. The course covers anatomy and physiology of CVS, examination of the heart, cardiac angiography, cardiac catheterization, nuclear medicine cardiac studies and applications of ultrasound. It also covers various types of radiographic procedures for angiography. The student should: (1) describe anatomy of the cardiovascular system (CVS), (2) list major pathological lesions of CVS, (3) evaluate condition of a CVS patient and mention precautions to be taken before the procedures, (4) prepare the patient for the procedure, execute the procedure and describe patient management after the procedure, (5) list indications, contraindications and complications of each procedures and mention methods of dealing with each complication, (6) name contrast media and radiochemical needed specifically needed for imaging modalities applicable to the system and mention the mechanism of their action, complication; and methods of avoiding or alleviating those complications, (7) perform or describe methods of preparations or performing various types of cardiography, arteriography and venography, and (8) write reports on the procedures in this system.

Title	Code	Semester/Duration	Credits
ULTRASOUND IMAGING	RAD-411	6,7 or 8/6weeks	6

This is a six-week-clerkship spent in a clinic or clinics providing the service. Observing and performing different U/S investigations abdomen,pelvis, obs and gyn A logbook containing the skills to be learned in the unit should be signed by the trainer in charge. A confidential report

should be filed mentioning the behavioural or ethical and social commitments of the student during this clerkship.

Title	Code	Semester/Duration	Credits
CT IMAGING	RAD-412	6,7 or 8/6weeks	6

This is a six-week-clerkship spent in a clinic or clinics providing the service. Observing and performing CT Investigations and protocols brain, abdomen, chest pelvis. A logbook containing the skills to be learned in the unit should be signed by the trainer in charge. A confidential report should be filed mentioning the behavioural or ethical and social commitments of the student during this clerkship.

Title	Code	Semester/Duration	Credits
MR IMAGING	RAD-413	6,7, or 8/2weeks	2

This is a two-week-clerkship spent in a clinic or clinics providing the service,Observing and performing MRI procedures,brain, chest, abdomen and pelvis. A logbook containing the skills to be learned in the unit should be signed by the trainer in charge. A confidential report should be filed mentioning the behavioural or ethical and social commitments of the student during this clerkship.

Title	Code	Semester/Duration	Credits
IMAGING UNIT MANAGEMENT	RAD-414	6,7 or 8/2weeks	2

This is a two-week-clerkship that covers the principles of management and safety of radiology and nuclear medicine units and laboratories. This course also covers quality control, including various types of quality assurance tests, quality control testing equipment and assessment of performance of various radiological equipments. The student should: (1) abide radiation protection legislations and regulations, (2) show administrative skills of running radiology and nuclear medicine units, (3) show competence in dealing with his / her staff and superiors, (4) keep records of patients, images, therapeutics, media and other supplies, (5) show ability of improving the work environment, (6) apply quality control measures in all units and laboratories of nuclear medicine and radiology labs, (7) list quality control procedures and methods in radiology laboratories, (8) assess performance of general radiographic equipment and analyze image quality, (9) perform quality control measures for conventional tomography, (10) describe quality control measures for mobile and mammographic equipment, (11) analyze film faults and artifacts, (12) assess CT system performance and image quality, and (13) assess performance of ultrasound and NM equipment.

Title	Code	Semester/Duration	Credits
GENITO-URINARY IMAGING	RAD-421	6,7 or 8/4weeks	4

This is a four-week-clerkship that enables students to acquire the necessary skills needed in clinical the situation and qualifies them to participate in undertaking basic and special projections for the genitor-urinary system (GUS) with or without contrast media, fluoroscopy. The course covers anatomy and physiology of GUS, examination of the kidneys, urinary bladder, ureters, and urethra as well as urinary catheterization, nuclear medicine procedures for GUS and applications of various imaging modalities specific for the system. The student should: (1) describe anatomy and physiology of the GUS, (2) list major pathological lesions of GUS, (2) evaluate condition of a male or female GUS patient and mention precautions to be taken before the procedures, (3) prepare the patient for the procedure, execute the procedure and describe patient management after the procedure, (4) list indications, contraindications and complications of each procedures and mention methods of dealing with each complication, (5) name contrast media and radiochemical needed specifically needed for imaging modalities applicable to the system and mention the mechanism of their action, complication; and methods of avoiding or alleviating those complications, (6) perform various types of intravenous urograms (IVU), retrograde and antegrade pyelography, urethrography and renal angiography, (7) define hysteroslpingography and perform ultrasound, CT and MRI for the ovaries and female reproductive tract, (8) mention precautions taken during pregnancy imaging and fetal monitoring, (9) perform pelvimetry, and (10) write reports on procedures in this system.

Title	Code	Semester/Duration	Credits
MUSCULOSKELETAL IMAGING	RAD-422	6,7 or 8/6weeks	6

This is a six-week-clerkship that enables students to acquire the necessary skills needed in clinical the situation and qualifies them to participate in undertaking basic and special projections for the musculoskeletal system (MSS) with or without contrast media, fluoroscopy. The course covers anatomy and physiology of MSS, examination of the upper and lower limb bone, spine, skull, and joints as well as sinuses and orbits, nuclear medicine procedures for MSS and applications of various imaging modalities specific for the system. The student should: (1) describe anatomy and physiology of the MSS, (2) list major pathological lesions of MSS, (3) evaluate condition of a MSS patient and mention precautions to be taken before the procedures, (4) prepare the patient for the procedure, execute the procedure and describe patient management after the procedure, (5) list indications, contraindications and complications of each procedures and mention methods of dealing with each complication, (6) name contrast media and radiochemical needed specifically needed for imaging modalities applicable to the system and mention the mechanism of their action, complication; and methods of avoiding or alleviating those complications, (7) perform plain bone radiographs, radionuclear bone scans, computed tomography for bone disease, MRI for MSS, and positioning and techniques used for bone trauma, and (8) write reports on the procedures in this system.

Title	Code	Semester/Duration	Credits
CNS AND ENDOCRINE IMAGING	RAD-423	6,7 or 8/4weeks	4

This is a four-week-clerkship that enables students to acquire the necessary skills needed in

clinical the situation and qualifies them to participate in undertaking basic and special procedures for the central nervous system (CNS) and endocrine system with or without contrast media, fluoroscopy. The course covers anatomy and physiology of CNS and major endocrine glands, examination of the CNS, spine, skull, pituitary gland, thyroid gland, and pineal body. It also addresses nuclear medicine procedures for CNS and endocrine glands, and applications of various imaging modalities specific for both systems. The student should: (1) describe anatomy and physiology of the CNS, pituitary, thyroid and pineal body, (2) list major pathological lesions of the brain, spinal cord and major endocrine glands, (3) evaluate condition of a CNS patient and mention precautions to be taken before the procedures, (4) prepare the patient for the procedure, execute the procedure and describe patient management after the procedure, (5) list indications, contraindications and complications of each procedures and mention methods of dealing with each complication, (6) name contrast media and radiochemical needed specifically needed for imaging modalities applicable to the system and mention the mechanism of their action, complication; and methods of avoiding or alleviating those complications, (7) list disadvantages of radionuclide imaging, (8) produce plain skull and pituitary fossa films, (9) define neurosonography and describe computed tomography procedures for head injuries, (10) perform or state the theoretical background radionuclear skull and spine scans, computed tomography for the skull, brain and spine and MRI for CNS, pituitary gland, pineal gland and thyroid gland, and (11) write reports on the procedures in these system.

Title	*Code*	*Semester/Duration*	*Credits*
GRADUATION PROJECT	RAD-431	During Semester 8/2weeks	2

FACULTY OF

NURSING & MIDWIFERY

UNDERGRADUATE & GRADUATE PROSPECTUS

VISION AND MISSION

The VISION of this programme is to be the first in the Sudan in quality premises, excellent design and implementation of modules, according to recent advances in health professionals education, the fairest in evaluation and the best in nursing professionalism.

The MISSION of the nursing programme is to graduate up-to-date service and research-oriented nurses, with a strong commitment to solve nursing health problems, in a rich-science environment, aligning, as an active member, with a comprehensive and devout health team.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Nursing and Midwifery, has to:

1 - Obtain pass mark in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.

3 - Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Nursing and Midwifery.

4 - Pay the published fees: 22,000 SDG or US $ 3,000 [international students] (2018).

CAREER ADVICE

Students qualified with this Bachelor Degree (B N) pass through a track decreed by the Health Professions Council, and are accredited as nurses and midwives, practice in hospitals, health centres both public and private, and may pursue postgrad studies to obtain master's degree or PhD in the field of nursing to qualify for university teaching staff, in programmed of health

professions. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence.

FACULTY OBJECTIVES

The objectives of the Faculty of Nursing and Midwifery National University are to:

1. Emphasize the values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National University's philosophy and message (see website www.nu.edu.sd).

2. Graduate a health professional with a Bachelors degree of Nursing (BN), competent in nursing sciences and skills with strong community orientation, social and ethical commitments, utilizing all recent developments in evidence-based nursing education and practice.

3. Contribute to community development through health services provided in its own health institutions, and other institutions co-operating with it, through the following: (a) partnership in designing health programmed and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) contribution in continuous education, through short and long term courses, to overcome the deficiency in the quantity and quality of nursing health workers and (c) provision of essential equipments and supplies to improve the quality of health services offered by the ministries of health.
4. Strengthen health, medical and health research in nursing, making used of the University's accessibility and communication privileges.

CURRICULUM OBJECTIVES [Characteristics of the Nursing graduate]

A graduate of the Faculty of Nursing and Midwifery - National University should be able to:

1. Adopt the strategies of the National University- Sudan and abide by its objectives, rules and regulations stated in the Charter (2015)

2. Observe, in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Allied Health Professions' Council), and maintain good and honest relations with her/his patients, their families, his/her colleagues across all sectors involved in health.

3. Appreciate the value of diversity and multi-ethnicity in solving nursing problems with emphatic, humane and fair practice.

4. Integrate basic, community, clinical nursing and laboratory sciences in solving community, family and individual health problems relevant to nursing sciences and practice.

5. Use scientific knowledge in the nursing management of health problems, according to

known methods of problem solving and integration, and show understanding of the scientific structural (anatomical), functional (physiological, biochemical), morbid (microbiological, pathological), and therapeutic (pharmacological) background related to the problem.

6. Manage emergencies and perform life-saving procedures and critical care, and decide and act properly on cases needing consultation with colleagues or referrals to specialized centres or personnel.

7. Show patience and tolerate when sitting and/or standing for relatively longer time in doing works, especially indicated by patient condition, well beyond working hours.

8. Handle chemical, biological and dangerous materials with caution and safety using the scientific approaches stated in procedures for dealing with these materials.

9. Perform medical history and physical examination according to the standard scheme, and carry out responsibilities of patient hygiene, bed making and vital sign recording according to the prescribed procedure.

10. Obtain samples from patients in the proper and timely manner and in a professional way.

11. Accept to work in all settings, urban or rural, served or under-served, according to needs, and acts to improve health service delivery systems both quantitatively and qualitatively.

12. Encourage community participation in patient and community nursing and help in recruiting various sectors in defining health related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics and traditional practices.

13. Adhere to the “health team” approach, acting as an efficient member, accepting labor and responsibilities given to its members, and promoting both effectiveness and homogeneity among members.

14. Continue to consider elements of efficiency, costing and economic implications in her/his nursing management and/or therapeutic choices.

15. Acquire the skills of teaching, learning and communicating efficiently to carry out her/his duties in health education and in winning the confidence of patients and their families.

16. Show respect to patients, supervisors, and colleagues, using satisfactory communication with them together with keeping confidentiality in all levels of communication and care.

17. Acquire the skills of independent learning and contribute to availing opportunities for planning and implementing continuous educational activities to upgrade her/his own abilities and those of her/his colleagues in the health team, benefiting from information technology.

18. Carry out health, or health-related research, alone or with other members of a team in health or other relevant sectors, using known and approved scientific methods.

19. Use computers in word processing of (both Arabic and English), presentations, spreadsheets, statistic packages and graphics to achieve success in other objectives of her/his career.

20. Acquire postgraduate qualification in the discipline of her/his choice, recognizing the needs of the society for certain specialties, particularly emergency, critical care, trauma, and maternal and child health nursing.

Feedback to students after mid-course and end of course assessment is an essential part of the nursing programme

EDUCATIONAL STRATEGIES AND METHODS

As stated in the Academic Regulations and in the general Prospectus of other programes, the learning strategies emphasize the following: (1) early acquisition of basic skills, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problem oriented instruction, (4) communityoriented and community-based activities, (5) integration of basic science, community and clinical practice, in a multidisciplinary approach, (6) self- and peer- education and evaluation, wherever relevant, (7) team-work attitude, (8) a range of elective modules, (9) continuous evaluation, (10) preparation for continuous professional development.

The Faculty adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions -once/ week at least (3) field practice in rural and primary health care settings and societies not less than 1/5th of the timetable, (4) practical sessions (laboratory, clinical, pharmaceutical industries) not less than 1/4th of the curriculum timetable, (5) skill laboratory (weekly) sessions, (6) lectures -not more than 1/3rd of the curriculum timetable (not more than 3 lectures/ day). (7) educational assignments, reports and research activities (as many as the programme would allow- at least one per module), (8) electives -not more than 10% of the curriculum timetable, and (9) graduation project.

TIMETALE

The curriculum follows the ‘semester system’ extending over 4 years: full eight semesters and short summer units. The first two semesters form the common preparatory year with medical and other health sciences programmed. The third semester, and partly the fourth semesters are common to all departments of the programme. The fourth to eighth semesters constitute mainly the specialization stage.

The programme applies the entry requirements, semester, modular and credit hour plans adopted by other National University programmes and abides by the Academic Regulations.

Semester 1 [24 CHs- 16weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Sudanese Studies -1	SUDN-110	Long	2	-	-	2
2	Islamic Studies -1	ISLAM-111	Long	2	-	-	2
3	Arabic Language-1	ARAB-112	Long	2	-	-	2
4	English Language -1	ENG-113	Long	2	-	-	2
5	Computer Science -1	ME-COMP-116	2	1	-	1	2
6	History and Ethics of Nursing	NUR-HIS-114	2	2	-	-	2
7	Sudanese Studies -2	SUDN-120	Long	2	-	-	2
8	Islamic Studies -2	ISLAM-121	Long	2	-	-	2
9	Arabic Language -2	ARAB-122	Long	2	-	-	2
10	English Language -2	ENG-123	Long	2	-	-	2
11	Behavioral science	NUR-BEHAV-119	Long	2	-	-	2
12	Community Health Nursing I	*NUR-COM-128	2	2	-	-	2
			16	23	2	1	24

Examination of longitudinal courses (+re-sits) 2 weeks

courses or examinations for late comers and failures.

Semester 2 [16 CHs- 19weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Human body Structure& Function-	NUR-ANAT-117	4	2	-	1	3
3	Basic biochemistry	NUR-BIOCH-118	3	2	-	-	3
4	Fundamental of Nursing	NUR-FUND-115	7	1	2	-	4
8	Microbiology & Paracitology	NUR-MICRO-127	2	2	_	-	2
			16	17	1	4	19

Examination of longitudinal courses (+re-sits) 2 week

SUMMER Activities -1 AND ELECTIVES.

1. 1000 -word report on “Internet Sources of Nursing Sciences” 1CH (E-131) 2CHs
2. Repeat courses or examinations for late comers and failures.

FIRSt YEAR PROGRAMME EVALUATION

Semester 3 [24 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Nutrition in health and illness	NUR-NUT- 211	Long.	-	-	2	2
2	Basic therapeutics (pharmacology)	NUR-PHARM-212	Long.	2	-	1	3
3	Principles of disease (Pathology)	NUR-DIS-213	3	2	-	1	3
4	Epidemiology	NUR-EPID-214	2	2	-	-	2
5	Adult nursing- medical -1	NUR-MED-215	6	1	-	2	3
6	Adult nursing- surgical-1	NUR-SURG-216	5	2	-	1	3
			16	11	-	8	19

Examination of longitudinal courses (+re-sits) 1 week Examination of longitudinal courses (+re-sits) 1 week

Semester 4 [22 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Educational technology	NUR-EDU-221	Long	-	-	2	2
2	Sociology and anthropology	NUR-SOCIO-222	Long	2	-	1	3
3	Communication skills and counseling	NUR-COUN-223	Long	2	-	1	3
4	Computer science - II	COMP-224	2	1	-	1	2
5	Adult nursing- medical - II	NUR-MED-225	7	4	-	3	7
6	Adult nursing- surgical- II	NUR-SURG-226	8	4	-	3	7
			17	13	-	11	24

Examination of longitudinal courses (+re-sits) 1 week

SUMMER ACTIVITIES- 2 AND ELECTIVE MODULES - Repeat courses or examinations for late comers and failures

SECOND YEAR PROGRAMME EVALUATION

Semester 5 [18 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Health Economics	NUR-HEC-311	Long	2	-	-	2
2	Primary health care	NUR-PHC-312	3	3	-	-	2
3	Genetics	NUR-GEN -313	2	-	1	1	2
4	Obstetrics nursing	NUR-OBS-314	8	4	-	4	8
5	Gynecological nursing	NUR-GYN -315	4	2		2	4
			17	11	1	7	18

Examination of longitudinal courses (+re-sits) 1 week
Repeat courses or examinations for late comers and failures.

Semester 6 [20 CHs- 18 weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Statistics	NUR-STAT-321	long	-	-	2	2
2	Nursing theory	NUR-THEO-322	long	2	-	-	2
3	Child Health care	NUR-CHC-323	2	-	-	2	2
4	Paediatric nursing	NUR-PED-324	7	4	-	3	7
5	Psychiatric Nursing	NUR-PSYC-325	5	3	--	2	5
6	Research Methodology	NUR-REC-326	2	2	-	-	2
			16	11	-	9	20

Examinations (2weeks)
SUMMER Activities- 3 AND ELECTIVES Repeat courses or examinations for late comers and failures

THIRD YEAR PROGRAMME EVALUATION

Semester 7 [22 CHs- 19 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Graduation Project	NUR-PRO-411	long	1	-	1	2
2	Forensic Medicine &law	NUR-LAW-412	long	2	-	-	2
3	Nursing informatics	NUR-INFO-413	long	2	-	-	2
4	Emergency and critical care	NUR-EMER-414	6	3	-	3	6
5	Nursing leader- ship and care management	NUR-LAD-415	4	2	-	2	4
6	Geriatric nursing	NUR-GERI-416	2	2	-	-	2
7	Community nursing - II	NUR-COM-417	5	2	-	2	4
			17	14		8	22

Examinations (2weeks)

Semester 8 [20 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Graduation Project	NUR-PRO-421	Long	1	-	1	2
2	Medical nursing (consolidation)	NUR-MED-422	5	1	-	4	5
3	Surgical nursing (consolidation)	NUR-SURG-423	5	1	-	4	5
4	Obstetrics and gynaecological nursing (consolidation)	NUR-OBGYB-424	4	1	-	3	4
5	Paediatric nursing(consolidation)	NUR-PED-425	4	1	--	3	4
			18	9	-	11	20

Examinations (2weeks)

GRADUATION AND CLERKSHIP EVALUATION is at the end of each clerkship= see ISO-9001 forms of programme evaluation.

COURSE OUTLINES

NOTE: In each module the outline includes the basic concepts. Detailed behavioural objectives and hourly timetables will be designed later by specific coordinators.

Title	*Code*	*Semester/Duration*	*Credits*
ISLAMIC STUDIES	ISLAM-111+121	1and 2/Longitudinal	4+4

This is a National Requirement compulsory to all Muslim Students, which includes two courses: 111 in Phase 1, and 121 in Phase 2. Their contents are: (1) the recitation of two Suras of the Holy Quran, which introduces a lot of behavioural and ethical issues for mankind as well as

for Muslims, (2) the basic sources of religious thought and religious groups, (3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that may arise from emerging issues that require ethical discussion, leading to better understanding between individuals in groups, to live in a peaceful and constructively save environment and society.

Title	Code	Semester/Duration	Credits
ARABIC LANGUAGE	ARAB-112+122	1and 2/Longitudinal	4+4

This is a National Requirement compulsory to all Arabic Speaking Students, which includes two courses: 112 in Phase 1, and 122 in Phase 2. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE	ENG-113+123	1/Longitudinal	2

The sources of health information in the world are written in English. The internet navigation to obtain information is basically in English. Some of the patients, attending clinics in Sudan, may only speak English language, especially with open-up of borders with economic development and of globalization. Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: (1) correct pronunciation of medical terns, including those related to health services in the country, (2) correct reading and showing understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some texts from English to Arabic, and others from Arabic to English, both sets from medical literature.

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES	SUDN - 110+120	1/Longitudinal	2

This is a National Requirement compulsory to all Students, which includes two courses: 110 in Semester 1, and 120 in Semester 2. It includes: (1)the geographic profile of the Sudan, (2) classification of the population and their distribution all over the country, (3) discussion and comparison of the various historical era of the Sudan, (4) main features of Sudanese economy, (5) educational policies and administrative rules in the country, (6) political systems that has governed the Sudan, (7) the legal system, (8) Sudan identity and culture, (9) elements of unity and harmony in social fabric, and (19) issues of diversity and cultural unity.

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCE	COMP-116+224	1/Block 2 weeks	2

Most of the textbooks of medicine and allied sciences are available on CDs, in which a large volume of knowledge is saved and easily retrievable. There are many software packages demonstrating methods and techniques in clinical skills including patient rapport in history taking, clinical examination, investigations and management. Students and teacher can access the internet for the unlimited sources of health information, both at their professional level and public level for health education. Students and future doctors are educators who have to prepare smart documents and presentations for the health team and profession at large. Knowledge of programmed like Word, Excel, and PowerPoint are indispensable for anyone -learner or teacher. Computer is important for students both in the developed or developing world, more so for the latter, who might not have inherited voluminous libraries in their colleges and have to utilize the virtual libraries available all over the world. Medical journal as hard copies are difficult to be owned by one institution, now almost all are available on-line for those who can use the computer efficiently. The course is intensive focusing on the basic principles of computer electronics and applications relevant to health science education. This is mainly on the hand-on experience in dealing with famous programmed like DOS, Word, Excel, PowerPoint, Access and Internet Explorer. The use of CDs is stressed covered as well as having e-mails and navigating the internet for health information including how to access medical journals, and communicate with scientists worldwide.

Title	Code	Semester/Duration	Credits
NURSING HISTORY AND ETHICS	NUR-HIS-115	1/block 2 weeks	2

This is a two weeks block course consisting of nursing history. It reviews the nursing development in Europe, Arab world and Sudan. It includes the general ethics in nursing profession.

The course provides the students with detailed information about the rules and regulations that govern nursing profession towards patients, community, and colleagues.

Title	Code	Semester/Duration	Credits
HUMAN BODY STRUCTURE & FUNCTION	NUR-ANAT-117+125	1,2 /block 4/3 weeks	3/3

A seven weeks block course divided into two parts in semester 1 &2.Upon the successful completion of this course the student will be able to describe and explain, at a basic level, the gross anatomy of the human body, especially the functional aspects of major tissues, organ, and systems including respiratory, cardiovascular digestive, urinary, reproductive, endocrine and nervous systems. Nursing is a practical career that requires sound training in basic skills. Before starting their clinical skills training; the students need to have good understanding of the anatomy and physiology of the human body.

Title	Code	Semester/Duration	Credits
FUNDAMENTAL OF NURSING	NUR-FUND-114+126	1,2/Block 5/6 weeks	4/4

This course gives a fundamental knowledge and understanding of the basic principles of nursing and focuses on developing skills in recognizing and meeting the basic needs of human beings with application of scientific principles.The course is divided into two parts in semester 1&2. The first part deals with skills and abilities that facilitate patients 'care. It includes :(1) the characteristics of nursing profession (2) first aid (3) bed making (4) bed bath (5) hygiene (6) vital signs (7) parental injection (8) nasogastric tube. The course provides the students with basic nursing skills required in nursing care (nursing process) for ill patients in all health institutions and services. Part 2 of fundamental nursing deals with skills and abilities that facilitate patients' care and (1) infection control (2) enema (3) collection of specimen (4) oxygen therapy (5) catheterization (6) wound care.

Title	Code	Semester/Duration	Credits
BIOCHEMISTRY	NUR-BIOC-118	1/Longitudinal	2

The practice of nursing requires basic knowledge of biochemistry and broad information about the process of metabolism in the human body this longitudinal course provides basic information of biochemistry, structure, function of cell, cellular transport mechanism, composition of carbohydrates, protein, vitamins and amino acids.

Title	Code	Semester/Duration	Credits
MICROBIOLOGY AND PARASITOLOGY	NUR-MICRO-127	2/Block 3 weeks	3

These three weeks modules focuses on: classification of micro-organisms-bacteria, viruses, fungi and parasites, the principles of sterilization and disinfection, the basics of immunology and methods of collection, handling and transportation of various specimens.

Title	Code	Semester/Duration	Credits
COMMUNITY HEALTH NURSING 1	NUR-HED-128	2/Block 3 weeks	2

This three- week module focuses on enabling the student to provide care for mothers and children through health education, promoting breast feeding, vaccination, and child nutrition, for the community, at large. It works on changing knowledge, attitudes, behaviour and health style of the individuals, and families, especially in the areas of nutrition, dental care, obesity, smoking and alcohol uptake, diabetes mellitus, asthma, tuberculosis, hypercholesterolemia, hypertension, ischemic heart disease, hepatitis, osteoporosis, drug addiction and premarital counseling.

This course provides the students with basic knowledge in community health and community nursing and focuses on assessing the environment and maintaining a healthy environment in student's residence, hostel, hospital and college.

Title	Code	Semester/Duration	Credits
BEHAVIOURAL SCIENCE	ME-BEHAV-124	2/Block 2 weeks	2

This is a two-week-block module includes: (1) definition of the psychosocial aspects of human development. (2) The significance of effective communication in the health provision process. (3) the genetic, developmental, and environmental factors that control human behaviour.(4) the values and attitudes that distinguish the medical profession from others.

The course also introduces the students to the relation between body and mind and interpersonal behaviour and explains the principles of psychology in the practice of nursing.

Title	Code	Semester/Duration	Credits
NUTRITION IN HEALTH AND ILLNESS	NUR-NUT-211	3/longitudinal	2

A longitudinal course that helps students understand the: (1) biochemical and physiological basis of nutrition, (2) nutritional substances and supplements including vitamins, (3) breast feeding, (4) daily nutritional requirements, (5) nutritional disorders in infancy and childhood including malnutrition, (6) deficiency of vitamins and certain other substances resulting in disease, (7) diagnosis and management of nutritional disorders, with particular reference to those occurring in the Sudan.

Title	Code	Semester/Duration	Credits
BASIC (therapeutics) PHARMACOLOGY	NUR-PHAR-212	3/longitudinal	3

A longitudinal course that includes: (1) definition of a drug, (2) development of a drug, (3) drug absorption and dynamics, (4) rational use of drugs in the management of emergency and common problems, including drug prescription for rhinitis, sinusitis, laryngitis, bronchitis, pneumonia, pulmonary TB, (5) interaction between drugs and of genes. with drugs for example glucose-6 phosphate dehydrogenase deficiency and sulphonamides and anti malarias, (6) clarify interrelationship between bacterial infections, inflammatory mediators, anti-inflammatory drugs and antimicrobial drugs, (7) effects of morphine, (8) clinical uses and side effects of aspirin, paracetemol, and non-steroidal anti-inflammatory drugs, (9) outline the use and side effects of levodopa (in Parkinson's disease), tricyclic antidepressants (in depression), benzodiazepines (in insomnia), antipsychotic drugs (in schizophrenia), antiepileptic (in seizures), muscarine antagonists, anticholinestrases, sympathomimetics and beta blockers.

It also includes (1) legal classification of medicinal products, (2) labeling and storage, (3) controlled drugs supply, ordering, administering, disposal and retention of records.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF DISEASE(PATHOLOGY)	NUR-DIS-213	3/block- 3weeks	3

This is a three-week block on general pathology and microbiology. It includes: (1) general histology, (2) morphology, classification, staining reactions, and pathogenicity of bacteria, viruses, fungi,

(3) sterilization and disinfection, (4) basic concepts in immunity, (5) principles of inheritance, introduction to molecular biology, and genetic defects underlying inherited disorders, (6) general pathology of inflammation, neoplasia and abnormal cell growth, (7) parasites and parasitic diseases, (8) anti-microbial and anti-parasitic drugs and neoplasm.

Title	Code	Semester/Duration	Credits
EPIDEMIOLOGY	NUR-EPID-214	3/Block - 2 weeks	2

A 2 week- block module which reviews the health system, the socioeconomic, psychological, behavioural and environmental factors related to epidemiology of disease and affecting its management, as well as primary health care. Most of the time is this course is devoted to weekly visits to health centres and villages trying to understand the health problems and help the local people and authorities in suggestions and involvement in solving them, not only in the investigative and diagnostic aspects, but the preventive and health promotion activities, as well. This is possible through the study of epidemiology and health research, and the methods used in community medicine to investigate epidemics, maternal and child health, and control of endemic and communicable diseases.

Title	Code	Semester/Duration	Credits
ADULT NURSING MEDICAL	NUR-MED-215+225	3/4/Block 6/7 weeks	5+7

This course is taught over two semesters- 3 & 4. It covers medical diseases, their patho-physiology, signs and symptoms, laboratory tests and imaging studies used in diagnosis, medical and nursing management using problems solving, and the role of nursing in monitoring the patient and prevention of complications.

Medical nursing provides the student with an opportunity to provide care to the adult patients with alteration in the cardiovascular,renal, reproductive gastrointestinal neurological sensory and clinical application of the nursing process based on problem solving (nursing process) when providing care for acutely ill medical patient with specific conditions Training on adult physical assessment skills is provided in acute care setting.

Title	Code	Semester/Duration	Credits
ADULT NURSING SURGICAL	NUR-SUR-216+226	3/4/Block -5/8weeks	5+7

This course is taught over two semesters- 3 & 4. It focuses on surgical conditions, their patho-physiology, signs and symptoms, laboratory tests and imaging studies used for diagnosis. It covers the surgical and nursing management based using problems solving, and the role of nursing in monitoring the patient and prevention of complications.

Students are trained in physical assessment skills for adult patients in acute care setting like closed chest drainage system, stoma care, preoperative, intra-operative and postoperative care, wound care and irrigation- dressing- binders and bandages, assisting with cast appli-

cation and removal, care of skin and skeletal traction, application and removal of chest tube drainage systems.

Title	Code	Semester/Duration	Credits
EDUCATIONAL TECHNOLOGY	NUR-EDU-221	4/longitudinal	2

This two weeks course explains the concept of teaching elements and components of the curriculum, defining the basic principles of teaching &learning, methods of teaching, methods of evaluation and teaching technology with practical applications.

Title	Code	Semester/Duration	Credits
SOCIOLOGY AND ANTHROPOLOGY	NUR-SOCIO-222	4/longitudinal	2

This is longitudinal course module discusses the various social systems in Sudan with emphasis on their effect upon the health of the community. It discusses the impact of cultural norms, traditions and beliefs on individuals and community in the country while as well as planning and implementing nursing care for the maintenance of health and prevention of illness.

Title	Code	Semester/Duration	Credits
COMMUNICATION AND COUNSELING SKILLS	NUR-COUN-223	4/longitudinal	2

This longitudinal course module defines and describes the principles of counseling. It explains the qualities of a counselor, describing situations where counseling can be used and discuss the different techniques of counseling and the available agencies for counseling in the community. Students will be trained in counseling patients and their families.

Title	Code	Semester/Duration	Credits
HEALTH ECONOMICS	NUR-HEC-311	5/longitudinal	2

This longitudinal course on health economics covers the definition of health economics, the concept of health economics and its implication in health planning. It reviews the effect of the individual's health and its impact on individual income. The course discusses the cost benefit and cost effectiveness of health, identify the needs and cost of a nursing unit, and how to plan a nursing unit including its cost effectiveness. It demonstrates ways to manage nursing services with minimum cost.

Title	Code	Semester/Duration	Credits
PRIMARY HEALTH CARE	NUR-PHC-312	5/ Block 4 weeks	2

This four-week block module on primary health care introduces the concept of PHC and its components, provision and coordination of care, collaborative and therapeutic practice prevention, the role and impact of nurses in the community. It identifies the local, national and global

examples of primary health care initiatives and the role of health promotion as a primary health care strategy.

Title	Code	Semester/Duration	Credits
GENETICS	NUR-GEN -313	5/Longitudinal	2

A two-credit longitudinal module that include: Discussion of the nature, principles and perspectives of heredity. Discussion of the maternal, prenatal and genetic influences on development of defects and disease. - List of the screening methods for genetic defects and diseases in neonates and children. Identification of some genetic disorders in adolescents and adults. Description of the role of nurses in genetic services and counseling.

Title	Code	Semester/Duration	Credits
OBSTETRICAL NURSING	NUR-OBS-314	5/Block -8 weeks	8

An eight - week-block module that covers: (1)the scope of maternity nursing, (2) review of anatomy and physiology of female reproductive system and female pelvis, (3) Pre-conception care and preparing for parenthood,(4) role of nurses in midwifery and obstetrical care (5) taking women's history and performing physical examination (6)national policy and legislation in relation to maternal health and welfare., (7) proper antenatal care(8) the physiology of conception., (9)physiology and stages of normal labour(10), (11) nursing care during labor,, (12) Assess and manage patients with high-risk pregnancy (13) the physiology of normal purperium.(14)hypertensive disorders of pregnancy (15) Heart disease during pregnancy(18) contraception and abortion, (19) sexually transmitted diseases(20) nursing care during labor, (21) nursing care of postpartum woman, (22) transition to parenthood, (23) newborn nutrition, (24) abnormalities during postnatal Periods,(25) Assessment and management of obstetrical emergencies, (26) ante partum and postpartum hemorrhage, (27) mental health disorders and substance abuse.

Title	Code	Semester/Duration	Credits
GYNAECOLOGICAL NURSING	NUR-GYN -315	5/block-4weeks	4

Four-week block on Gynecological nursing, discussing (1) The disorders of the menstrual cycle and the menopause (2) The inflammatory and malignant conditions of the female reproductive system (4) The methods of contraception; spacing, temporary and permanent and emergency contraception (5) diagnosis and treatment and nursing care of abortions (6) Inflammatory and malignant conditions of the female reproductive organs.

Title	Code	Semester/Duration	Credits
STATISTICS	NUR-STAT-321	6/block-2weeks	2

This is a two-credit block module on statistics. It introduces the student to the of biostatistics, the role of statistic in health care, the different types of data, the tools of data collection,

sources of data, methods of measuring the central tendency of a given set of data, definition of relation & coefficient, presentation of the result of analysis of given data, using the SPSS and the hospital health information system.

Title	Code	Semester/Duration	Credits
NURSING THEORY	NUR-THEO-322	6/block-2weeks	2

This two weeks block helps the student to:.define the nursing theories -Development of nursing theory - components of nursing theory -the most commonly used nursing theory.

Title	Code	Semester/Duration	Credits
CHILD HEALTH CARE	NUR-CHC-323	6/block-2 weeks	2

This 2 weeks course is designed to introduce the students to the concepts and principles of child health care. It provides them with knowledge and skills to provide nursing care to normal children of all age groups, and assess growth and development of normal children in community settings. It also motivates the nursing students to use the available community resources to provide child care.

Title	Code	Semester/Duration	Credits
PAEDIATRIC NURSING	NUR-PED-324	6/block-7 weeks	7

This seven weeks course introduces the students to the concepts and principles of pediatric nursing. It directs them to acquire knowledge and skills to provide nursing care for normal and high risk children. It also provides the students with the experience to deal with ill children in medical& surgical pediatric wards.

Title	Code	Semester/Duration	Credits
PSYCHIATRIC NURSING	NUR-psyc-325	6/Block -5 weeks	5

This is 5 weeks course covers the role and function of psychiatric nurse including recognizing various forms of mental illness, establishing facilitative communication, understanding and practicing effort to lower the incidence of illness in the community.

Title	Code	Semester/Duration	Credits
RESEARCH METHODOLOGY	NUR-RES-326	6/Block -2 weeks	2

This is a 2 week, block module designed to teach students how to conduct research study in nursing independently by using scientific statistical methods. It teaches the student how to write, present, interpret and utilize health related research.

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT	NUR-PRO-411+421	7,8/LONGTUDINAL	2

A longitudinal course reserved to writing a short thesis, which can be a review or experimental research. No formal didactic timetable is needed since students had a previous course on research methodology. Students will be supervised to decide on the topic title, and advised on starting and progress in writing. The cost of research and examinations is the responsibility of the candidate.

Title	Code	Semester/Duration	Credits
FORENSIC MEDICINE & LAW	NUR-LAW -412	7/longitudinal	2

A longitudinal course that covers: (1) Definition of forensic medicine (2) Understanding the medico 0legal issues (3)Describing signs and causes of death (4)Cooperation with justice authorities in crime detection whether the crime is committed by accident, suicide or homicide. (5)Understanding the effects of poisons on human beings through medical statistics.

Title	Code	Semester/Duration	Credits
NURSING INFORMATICS	NUR-INFO-413	7/longitudinal	2

A longitudinal course that includes: (1) Definition the terminology and classification of nursing information system(2) data entry and collection in different departments(3)Use of the internet as a source of health and nursing informatics (4)Discuss the role of information and information technology in the nursing profession(6)Use informatics resources: navigation and electronic communication (7)Design data base for health care(8)Discuss computer -based patient records; issues and ethics.

Title	Code	Semester/Duration	Credits
EMERGENCY AND CRITICAL CARE	NUR-EMER-414	7/block-6 week	6

A six- week- module that covers the following: (1) cardiovascular system: angina- acute myocardial infarction- heart failure, (2) respiratory system: mechanical ventilation- pulmonary embolism-acute respiratory distress, (3) gastrointestinal system: gastrointestinal bleeding- bowel obstruction- pancreatitis- liver failure, (4) renal system: acute tubular necrosis- hyperosmolar non-ketotic coma- diabetes incipidus, cerebral salt wasting, (5) hematologic system: acute sepsis- thrombocytopenia- disseminated intravascular coagulation, (6) nervous system: seizure- status epileptic us- meningitis- spinal cord injuries, (7) integumentary system: burns, skin breakdown, necrotizing fasciitis, (8) multi-system: multiorgan dysfunction syndrome. (9)Perform management of patients with the following emergency medical conditions: Pulmonary embolism-Seizure disorders-Diabetic ketoacidosis.-Cardiac arrest-Cardiac failure-Arrhythmias-Shock-Asthma (10) Perform management of patients with the following emergency surgical conditions: Chest Trauma-Flail chest-Hemorrhage/shock-Abdominal trauma-Back injury-Head injuries.

Title	Code	Semester/Duration	Credits
NURSING LEADERSHIP AND CARE MANAGEMENT	NUR-LAD-415	7/block-4 weeks	4

This is a four- week-block module that describes: (1) the hospital as a system(2)recognize health and nursing organizational set up at various levels.(3)differentiate between public and private administration(4)discuss management process in nursing and the role of the nurse manager(5) identify the functions and attributes necessary for effective management(6)identify economic, demographic and technological changes affecting nursing practice and formulate reforms for change.(7)apply principles of management in hospitals, nursing education programmed, and community health care units at all levels.(8)demonstrate leadership in professional nursing practice(9)establish collaborative relationship with the other members of the health care team &the public.(10)discuss the importance of integrating nursing practice, education, & research for improving the quality of nursing services.(11)discuss the role of nurse manager in organizing emergency nursing and other support services(12)identify and analyze ethical & legal issues in nursing management(14)identify areas of research in nursing management.

Title	Code	Semester/Duration	Credits
GERIATRICS NURSING	NUR-GERI-416	7/block-2 weeks	2

A two- week-block module that teaches the students to :(1) Perform a comprehensive assessment of an older person, including mood, cognition, gait, nutrition and fitness for surgery in an in-patient, out-patient, day hospital or community setting. (2) Manage acute illness in old age in an in-patient setting and community setting. (3) manage patients with chronic disease and disability in an in-patient, out-patient, day hospital and community setting. (4) plan the discharge of frail older patients from hospital. (5) assess and manage older patients presenting with the common geriatric problems in an inpatient or outpatient setting -falls with or without fracture, delirium,incontinence and poor mobility. (6) demonstrate an appropriate level of competence in the following sub-specialties: palliative care, ortho- geriatrics, old age psychiatry and specialist stroke care.

Title	Code	Semester/Duration	Credits
COMMUNITY HEALTH NURSING-2	NUR-COM-417	7lblock-5 weeks	4

This is a five- week-block module that teaches the students to: (1) assesse community health and plan a community health programme. (2) describe the various components of reproductive and child health programme. (3) demonstrate leadership abilities in organizing community health nursing services by using inter-sectoral approach. (4) describe the role and responsibilities of community health nurse in various national health and family welfare programmed.(5) participate in the implementation of various national health and family welfare programmed.(6)demonstrate competencies in providing family centred nursing care independently (7) participate / conduct re-

search for new sights and innovate solutions to health problems. (8) Teach and supervise nurses and allied health workers.(9)design a layout of sub centre / primary health centre / community health care and develop standards for community health nursing practice.

Title	Code	Semester/Duration	Credits
MEDICAL NURSING-CONSOLIDATION	NUR-MED-422	8/Block -5weeks	5

This is a five-week-block module that offers: (1) a review of the aspects of medical nursing care in Module NUR-MED-312, (2) various aspects of practical nursing care to those patients with medical problems in adult patients in the ward (ambulant or bed-ridden), and outpatient clinics, (3) learning and discussing respiratory, cardiovascular, gastrointestinal, urinary, endocrine and rheumatic diseases, (4) special care of the unconscious patient, those with fluid and electrolyte imbalance and malignant disease.

Title	Code	Semester/Duration	Credits
SURGICAL NURSING -CONSOLIDATION	NUR-SURG-423	8/Block -5 weeks	5

This is a five-week-block module that covers: (1)a review of the aspects of surgical care in Module NUR-SUR-313, (2) various aspects of practical nursing care to those patients with surgical problems in adult patients in the ward (ambulant or bed-ridden), and outpatient clinics, (3) learning and discussing respiratory, cardiovascular, gastrointestinal,- urinary, endocrine and rheumatic diseases that require or undergoing surgery, (4) operative and postoperative care, (5) the special care of the unconscious patient, those with fluid and electrolyte imbalance and malignant disease.

Title	Code	Semester/Duration	Credits
OBSTETRIC AND GYNAECOLOGICAL NURSING - CONSOLIDATION	NUR-OB/GYN-424	8/Block -4weeks	4

This is a four-week-block module that covers: (1) nursing care of women who suffer organic and psychological disorders due to gynecologic causes and normal and abnormal obstetrical course, (2) review of the structural and functional aspect of female reproductive system, (3) taking of obstetric and gynecologic history and performing antenatal care, (4) diagnosis of pregnancy and recognition of normal and abnormal pregnancy, (5) discussion and management of normal labor and suggesting diagnostic and management plan for expected abnormal labor, and (6) showing understanding of the precaution taken in medications and investigation done to pregnant women.

Title	Code	Semester/Duration	Credits
PAEDIATRIC NURSING -CONSOLIDATION	NUR-PED-425	7/Block -4 weeks	4

A four- week-block module that reviews the basic concepts in module NUR-PED-322, and covers: (1) growth and development of the child, (2) family-centre nursing care, health promo-

tion during infancy, childhood, school age and adolescence, (3) physical assessment of child, emergency care of children, medicating infants and children and pain management for children, (4) child with infectious disease, immunologic alteration, fluid and electrolyte alterations, hematologic, respiratory, cardiovascular, gastrointestinal, genitourinary, neurologic alterations, (5) growth charts and anthropometric assessment. Children with cognitive impairment are to be managed with patients with special problems.

FACULTY OF

MEDICAL LABORATORY SCIENCES

UNDERGRADUATE
& GRADUATE
PROSPECTUS

RATIONALE

The great advances in health services in the Sudan and the World-wide progress in (and proliferation of) medial laboratory diagnostic technologies, have necessitated increasing the number Sudanese specialists in medical laboratory sciences. The programme leads to Bachelor Degree (honours)nin Medical Laboratory Sciences [B (Hon). MLS]. The goal of the programme is to respond to the needs of local (rural and urban) and Arab labour markets and to improve performance in diagnostic medical laboratory units, which increase in space and details on daily basis.

VISION AND MISSION

The VISION of the MLS Faculty is to be the best institution in the Sudan providing this type of professional education, as manifested by excellent learning environment and facilities, well-structured curriculum and reputable positives choices of study and practice.

The MISSION is to graduate up-to-date research-oriented medical technologists, with a strong commitment to solve health problems, in a rich science environment, aligning with a comprehensive and devout health team.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Medical Laboratory Sciences, has to:

1. Obtain pass mark in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology.. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of the General Directorate of Admission and Accreditation (GDAA), Ministry of Higher Education, Sudan.
2. Achieve the percentage in Sudan School Certificate announced every year-e.g. 70% (International students may have 10% less in the School Certificate scores of their own country, if approved by the GDAA).

3. Apply electronically though the website of GDAA (www.mhe.sd.gov/admission), or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Medical Laboratory Sciences.
4. Pay the published fees: 37,000 SDG or US $ 4500 [international students] (2018).

CAREER ADVICE

Students qualified with this Bachelor degree pass through a track decreed by the Medical and Health Professions Council, and are accredited as Second Laboratory Specialist. They may pursue postgrad studies to obtain master's degree or PhD in the field of medical labs to qualify for a university teaching job, in programmes of health professions. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence.

FACULTY OBJECTIVES

The objectives of The Faculty of-MLS National University are to :

- Emphasize the values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National university philosophy and message (see Mission and Message at website www.nu.edu.sd)
- Graduate a health professional with a bachelors degree in Medical Laboratory Science (B.MLS) Honours, competent in laboratory sciences and skills, with strong community orientation, social and ethical commitments, aware of and utilizing all recent and emerging developments in evidence-based laboratory science education and practice.
- Contribute to community development through health services provided in its own health institutions, and other institutions cooperating with them, through: (a) partnership in designing health programmed and plans, and implement whatever is feasible in utilizing the specialists, (b) contribute in continuous education, through self-directed learning of technologists, and (c) provision of essential equipments and supplies to improve the quality of health services planned by the ministries of health and other related sectors.
- Strengthen medical and health research in MLS, making use of the University's infrastructural privileges and national and international relations.

CURRICULUM OBJECTIVES [Characteristics of the MLS graduate]

A graduate of the National University, Faculty of MLS Programme should be able to:

1. Adopt the strategies of the National Unversity - Sudan and abide by its objectives, rules and regulations stated in the University Charter (issued on Dec 17, 2015)

2. Observe, in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Allied Health Professions' Council), and maintain good and honest relations with her/his, their families, his/her colleagues across all sectors involved in health.
3. Appreciate the value of diversity and multi-ethnicity in solving laboratory work with emphatic, humane and fair practice.
4. Integrate basic, community, laboratory and clinical sciences in solving community, family and individual health problems relevant to laboratory sciences.
5. Use scientific knowledge in investigating health problems, according to known methods and procedures, and show understanding of the scientific structural (anatomical), functional (physiological, biochemical), morbid (microbiological, pathological), and therapeutic (pharmacological) background related to the problem.
6. Take specimens timely and professionally, and arrange for comfort of the patient and relatives, especially in tests taking longer time.
7. Follow correctly the practical steps of completion and explanation of testing biochemical, hematological, immunological, microbiological and histochemical components in biological specimens
8. Differentiate colour, smell, clarity and viscosity of biological and chemical specimens relevant to human health.
9. Carry out the correct histological and histochemical techniques and use correctly the facilities of light microscope.
10. Show understanding of the techniques for ultrastructural or electron microscopy, outline the components of transmission and scanning machines and recognize images from both.
11. Run laboratory test using common equipments and take safety precautions of fellow workers, patients, public, equipments and building- in dealing with chemicals and specimens.
12. Manage the investigative plan in emergencies and life-saving situations, and decide and act properly on cases needing referrals to specialized centres and personnel.
13. Accept to work in all settings according to needs, and act to improve health service delivery system both quantitatively and qualitatively.
14. Encourage community participation and help in recruiting various sectors in defining health related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics and traditional practices.
15. Adhere to the "health team" approach, acting as an efficient member, accepting labor and responsibilities given to its members, and promoting both effectiveness and homogeneity among members.

16. Continue to consider elements of efficiency, costing and economic implications in her/his approach to (and choice of) laboratory procedures.

17. Acquire the skills of teaching, learning and communicating efficiently to carry out his/her duties in health education and in winning the confidence of patients and their families.

18. Show respect to patients, supervisors and colleagues using productive communication with each of them, and observing confidentiality at all levels of communication and care.

19. Acquire the skills of independent learning and contribute to availing opportunities for planning and implementing continuous educational activities to upgrade her/his own abilities and those of his/her colleagues in the health team, benefiting from the rising tide of information technology.

20. Carry out health and health-related research, alone or the other members of the a team in health or with other relevant sectors, using known (or approved) scientific methods.

21. Use computers in word processing (both Arabic and English), presentations, spread sheets, statistical packages and graphics to achieve success in other objectives of his/her career.

22. Acquire postgraduate qualifications in the discipline of her/his choice, recognizing the needs of the society for certain specialties, particularly parasitology, immunology, molecular biology, drug development, production and maintenance of medical laboratory equipments, media, reagents and other supplies.

Feedback to students after mid-course and end of course assessment is an essential part of the MLS programme

EDUCATIONAL STRATEGIES AND METHODS

As stated in the Academic Regulations and in the general Prospectus of other faculties, the learning strategies emphasize the following: (1) early acquisition of basic skills, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problem oriented instruction, (4) community-oriented and community-based activities, (5) integration of basic science, community and clinical practice, in a multidisciplinary approach, (6) self- and peer- education and evaluation, wherever relevant, (7) team-work attitude, (8) a range of elective modules, (9) continuous evaluation, (10) preparation for continuous professional development.

EDUCATIONAL METHODS

The Faculty adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions - once/ week at least (3) field practice in rural and primary health care settings and societies not less than 1/5th of the timetable, (4) practical sessions (laboratory, clinical,

pharmaceutical industries) not less than 1/4th of the curriculum timetable, (5) skill laboratory (weekly) sessions, (6) lectures -not more than 1/3rd of the curriculum timetable (not more than 3 lectures/day). (7) educational assignments, reports and research activities (as many as the programme would allow- at least one per module), (8) electives -not more than 10% of the curriculum timetable, and (9) graduation project.

EVALUATION [According to Academic Regulations]

Short modules (three weeks or less) are evaluated on the first Saturday following the last session of instruction through best answer MCQs, brief answer questions and problems. Continuous assessment should include attendance, contribution, coordination, assignments and seminars. Practical examination (if relevant) should be arranged during the course of instruction or on the Wednesday/Thursday that precedes the theoretical examination on Saturday. Unless exception and permission are justified by dean and coordinators, the regulations of the college do not consider oral examination as a fair means of assessment.

Longer modules (four weeks or more) are evaluated by mid-course and end-of -course examinations, The former

should not account for more than 20% of the total marks. The theoretical examination of either is done on the mid- and final Saturday of the module. Other details (as in short modules) are the same.

PLANNING OF COURSES

The curriculum follows the 'semester system' extending over 4 years: full eight semesters and short summer units, offering over 160 CHs. The first two semesters form the common preparatory year with medical and other health sciences faculties. The third semester, and partly the fourth semesters are common to all departments of the faculty. The fourth to eighth semesters constitute mainly the specialization stage in MLS, and the last two semesters (seven and eight) represent the subspecialty in one the five departments of MLS..

The faculty applies the general semester, modular and credit hour plans adopted by National university and abides by the Academic Regulations.

PREMISES AND TRAINING SITES

The theoretical sessions will be carried out in class room SF-7 (first year) and class rooms B-6 and B-8 (the following years). The practical session will be taken in laboratories GF- FF-6, FF-11, SF-3, SF-11. Khartoum State and University hospitals, National University Research Institute [**NURI]** there is a signed training agreement with the Military Hospital Omdurman, Ibn Sina Hospital and many health centres. Field training and rural residence will be arranged in less served distant areas in the country.

TIMETABLE

Semester 1 [20 CHs- 19 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Orientation week	-	1	-	-	-	-
2	Islamic Studies-1	MLS-ISLAM-111	Longit.	2	-	-	2
3	Arabic Language-1	MLS-ARAB-112	Longit.	2	-	-	2
4	English Language-1	MLS-ENG-113	Longit.	2	-	-	2
5	Sudanese Studies-1	MLS-SUDN-110	Longit.	2	-	-	2
6	Islamic Studies-2	MLS-ISLAM-121	Longit.	2	-	-	2
7	Arabic Language-2	MLS-ARAB-122	Longit.	-	-	-	-
8	English Language-2	MLS-ENG-123	Longit.	2	-	-	2
9	Sudanese Studies-2	MLS-SUDN-120	Longit.	2	-	-	2
10	Computer Science	MLS-COMP-116	Longit.	2	-	1	3
11	General Chemistry	MLS-CHEM-117	Longit.	2	-	1	2
				19		2	20

Examination of longitudinal courses (+re-sits) 2 weeks

Courses or examinations for late comers and failures.

Semester 2 [19 CHs- 18 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Physiology	MLS-PHYSIO-121	Long.	2	-	-	2
2	Basic Biochemistry	MLS-BIOC-122	Long.	2	-	-	2
3	Introduction to Medicie and Medical Education	MLS-MEDU-123	Long.	2	-	-	2
4	Physics for Medical Equipment & Investigations	MLS-PHYS-124	Long.	2	-	-	2
5	Biostatistics	MLS-STAT-125	Long.	2	-	-	2
6	Introduction to medical ethics	MLS-ETHIC-126	Long.	2	-	-	3
7	Anatomy	MLS--ANAT-127	3	2	1	1	3
8	Human Genetics	MLS-GENE-128	3	2	_	-	3
			18	18	1	4	19

Examination of longitudinal courses (+re-sits) 2 week

SUMMAR 1 AND ELECTIVES.

1. Medical terminology- Laboratory and data collection (MLS-SUM-131) 2 CHs
2. 1000 -word report on “Internet Sources of Medical Laboratory Sciences” 1CH (E-131) 2CHs
3. Health Care System Elective (SUM-ELEC-132):2 CHs
4. Repeat courses or examinations for late comers and failures.

FIRST YEAR PROGRAMME EVALUATION

Semester 3 [19 CHs- 18 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Basic Professional Skills-1	MLS - SKILL-211	Long.	-	-	2	2
2	Introduction to MLS	MLS - INTR-212	2	2	-	-	2
3	Basic Pathology	MLS - PATH-213	4	2	-	1	3
4	Basic Haematology	MLS-BHEM-214					
5	Basic Immunology	MLS - IMUN-215	3	2	-	1	3
6	Serology & Immuno-haematology	MLS -SERO-216	3	2	-	1	3
7	Clinical Biochemistry	MLS-CCHM-217	3	2	-	1	3
			18	13	-	6	19

Examination of longitudinal courses (+re-sits) 1 week

Semester 4 [21 CHs- 19 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Basic Professional Skills-2	MLS-SKIL-221	Long.	-	-	2	2
2	Basic Histology and Histological Techniques	MLS-HIST-222	5	2	-	2	4
3	Medical Entomology and Parasitology	MLS-PARA-223	2	2	-	1	3
4	Basic Microbiology	MLS-BMIC-224	4	2	-	2	4
5	Protozology	MLS-PROT-225	4	2	-	2	4
6	Clinical Microbiology-1	MLS-CMIC-226	4	2	-	2	4
			19	10	-	11	21

Examination of longitudinal courses (+re-sits) 1 week

SUMMAR 2 AND ELEVTIVE MODULES

1. Research methodology and scientific writing- Rural Research Residency (MLS-REC 231) 2 CHs
2. Repeat courses or examinations for late comers and failures.

Semester 5 [22 CHs - 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Basic Professional Skills-3	MLS-SKIL-311	Long.	0	0	2	2
2	Clinical Biochemistry -2	MLS-CCHM-312	6	3	0	3	6
3	Helminthology	MLS-HLMT-313	4	2	0	2	4
4	Cytological and Histopathological Techniques	MLS-CYTO-314	6	3	0	3	6
5	Clinical Microbiology-2	MLS-CMIC-315	4	2	0	2	4
			20	10	0	12	22

Examination of longitudinal courses (+re-sits) 1 week

Repeat courses or examinations for late comers and failures.

Semester 6 [20 CHs- 20 weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Basic Professional Skills-4	MLS-SKIL-321	Long.	0	0	2	2
2	Public Health	MLS-PUBH-322	3	2	0	0	2
3	Laboratory Management and Quality Assurance	MLS-QUAL-323	3	2	0	0	2
4	Advanced Haematology	MLS-HEMA-324	6	3.5	0	3.5	7
5	Molecular Biology and Techniques	MLS-MLBT-325	3	2	0	1	3
6	Introduction to Research	MLS-RESH-326	2	2	0	0	2
7	In-Service Training	MLS-TRIN-327	3	0	0	2	2
			20	11.5	0	8.5	20

Examination of longitudinal courses (+re-sits) 1 week

SUMMAR 3 AND ELECTIVES

Rural Hospital Laboratory Residency (MLS-SUM-331), 2 CHs/Block 2 weeks

Elective (E332): A 1000 work essay on malpractice in MLS 1CH

Repeat courses or examinations for late comers and failures.

Phase 3:s

Phase 3: Specialization Rotations

Semester 7 [20 CHs - 20weeks] and Semester 8 [22 CHs- 20 weeks].

Clinical Chemistry	Haematology and Immunohaematology	Histopathology and Cytology	Microbiology and Clinical Immunology	Parasitology and Medical Entomology
Semester 7				
Primary Care Clinical Chemistry MLS-CCHM-411 6 CHs (6 weeks)	Anaemias and Haemoglobin Disorders Investigations MLS-HAEM-411 8 CHs (8 weeks)	Cytology and Cytological Techniques MLS-HIST-411 5 CHs (6 weeks)	Immunological Techniques MLS-MICR-411 6 CHs (6 weeks)	Parasitology and Immunoparasitology MLS-PARA-411 8 CHs (8weeks)
Advanced Clinical Chemistry MLS-CCHM-412 6 CHs (6 weeks)	Leukaemias and Lymphomas Investigations MLS-HAEM-412 6 CHs (6 weeks)	Histopathological Techniques MLS-HIST-412 7 CHs (7 weeks)	Bacteriological Techniques MLS-MICR-412 8 CHs (8 weeks)	Tropical Diseases and Public Health MLS-PARA-412 8 CHs (8weeks)
Clinical Chemistry and Public Health MLS-CCHM-413 6 CHs (6 weeks)	Haemostasis and Bleeding Disorders Investigations MLS-HAEM-413 4 CHs (4 weeks)	Immunohistochemical Techniques MLS-HIST-413 4 CHs (3 weeks) Electron Microscopy Techniques MLS-HIST-415 2 CHs (2 weeks)	Mycology MLS-MICR-413, 4 CHs (4 weeks)	Medical Entomology MLS-PARA-413 2 CHs (2 weeks)
Evidence Based Practice in Medical Laboratory Sciences MLS-CCHM-414 2 CHs (2 weeks)	Evidence Based Practice in Medical Laboratory Sciences MLS-HAEM-414 2 CHs (2 weeks)	Evidence Based Practice in Medical Laboratory Sciences MLS-HIST-414 2 CHs (2 weeks)	Evidence Based Practice in Medical Laboratory Sciences MLS-MICR-414 2 CHs (2 weeks)	Evidence Based Practice in Medical Laboratory Sciences MLS-PARA-414 2 CHs (2 weeks)
Semester 8				
Clinical Chemistry Equipments MLS-CCHM-421 6 CHs (6 weeks)	Basic Haematological Diagnosis MLS-HAEM-421 6 CHs (6 weeks)	Cytogenetics and Molecular Techniques MLS-HIST-421, 6 CHs (6 weeks)	Virology Techniques MLS-MICR-421 6 CHs (6 weeks)	Basic Parasitological Diagnosis MLS-PARA-421 6 CHS (6 weeks)
Basic Clinical Chemistry Diagnosis MLS-CCHM-422 6 CHs (6 weeks)	Field Training in Clinical Haematology and Blood Banking MLS-HAEM-422 6 CHs (6 weeks)	Basic Histopathological Diagnosis MLS-HIST-422 6 CHs (6 weeks)	Infection Control MLS-MICR-422, 6 CHs (6 weeks)	Field Training in Parasitology Techniques and Infection Control MLS-PARA-422 6 CHs (6 weeks)
Laboratory Management and Economics MLS-CCHM-423 2 CHs (2 weeks)	Laboratory Management and Economics MLS-HAEM-423 2 CHs (2 weeks)	Laboratory Management and Economics MLS-HIST-423 2 CHs (2 weeks)	Laboratory Management and Economics MLS-MICR-423 2 CHs (2 weeks)	Laboratory Management and Economics MLS-PARA-423 2 CHs (2 weeks)
Health Information System MLS-CCHM-424 2 CHs (2 weeks)	Health Information System MLS-HAEM-424 2 CHs (2 weeks)	Health Information System MLS-HIST-424 2 CHs (2 weeks)	Health Information System MLS-MICR-424 2 CHs (2 weeks)	Health Information System MLS-PARA-424 2 CHs (2 weeks)
Graduation Project MLS-RESH-425 6 CHs (Longitudinal)	Graduation Project MLS-RESH-425 6 CHs (Longitudinal)	Graduation Project MLS-RESH-425 6 CHs (Longitudinal)	Graduation Project MLS-RESH-425 6 CHs (Longitudinal)	Graduation Project MLS-RESH-425 6 CHs (Longitudinal)

Examinations (2weeks) : GRADUATION AND CLERKSHIP EVALUATION is at the end of each clerkship= see ISO-9001 forms of programme evaluation GRADUATION

OUTLINE OF COURSES

NOTE: In each course the outline includes the basic concepts. Detailed behavioural objectives and hourly timetables will be designed later by specific coordinators.

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES-1,2	MLS- SUDN-110+120	1 and 2/Longitudinal	2 and 2

This is a National Requirement compulsory to all Students, which includes two courses: 110 in Semester 1, and 120 in Semester 2. They include: (1) the geographic profile of the Sudan, (2) classification of the population and their distribution all over the country, (3) discussion and comparison of the various historical era of the Sudan, (4) main features of Sudanese economy, (5) educational policies and administrative rules in the country, (6) political systems that has governed the Sudan, (7) the legal system, (8) Sudan identity and culture, (9) elements of unity and harmony in social fabric, and (19) issues of diversity and cultural unity.

Most of the content is detailed in the University Notes (Prof. Osama AbdelRahman Book); the rest is obtained by self-directed learning and written assignments. The coordinators may decide to use other reference that fulfills the objectives.

Title	Code	Semester/Duration	Credits
ISLAMIC STUDIES-1,2	MLS-ISLA-111+121	1 and 2/Longitudinal	2 and 2

This is a National Requirement compulsory to all Muslim Students, which includes two courses: 111 in Phase 1, and 121 in Phase 2. Their contents are: (1) the recitation of two Suras of the Holy Quran, which introduces a lot of behavioural and ethical issues for mankind as well as for Muslims, (2) the basic sources of religious thought and religious groups, (3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that are may arise from emerging issues that require ethical discussion, that leads to better understanding between individuals in groups, to help living in a peaceful and constructively save environment and society.

Most of this content is detailed in the University Notes (NU- 111/05, and (121/06), the rest is obtained by self-directed learning and written assignments.

Title	Code	Semester/Duration	Credits
Arabic Language-1,2	MLS-ARAB-112 + 122	1 and 2/Longitudinal	2 and 2

This is a National Requirement compulsory to all Arab Speaking Students, which includes two courses: 112 in Phase 1, and 122 in Phase 2. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

Most of the content is detailed in the University Notes (NU- 112/05, and (122/06), the rest is obtained by self-directed learning and written assignment.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE-1, 2	MLS-ENGL-113+123	1 and 2/Longitudinal	2 and 2

The sources of health information in the World are still in English. The Internet navigation to obtain information is basically in English. Some of the patients, attending clinics in Sudan, may only speak English language, especially with open-up of borders with economic development and of globalization. Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: (1) correct pronunciation of medical terns, including those related to health services in the country, (2) correct reading and showing understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some pieces from English to Arabic, and three others from Arabic to English, both sets from medical literature.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICINE AND MEDICAL EDUCATION	MLS-MEDU-114	1/Block 2 weeks	2

This is a two-week block course, that includes: (1) a simple medical problem that emphasize the meaning and message of health, (2) health care delivery system in the country, (3) the role of the physician in health care, (4) role of other professional and administrative staff, (5) priority health problems, (6) concepts and principles of learning, (7) adult education and learning, (8) student centred and problem-based learning, (9) instructional techniques (lecture, small group etc), (10) student assessment methods, (11) holistic approach to patient's problems, (12) interdisciplinary and partnership concepts, (13) curriculum development, (14) programme evaluation, (15) leadership and (16) professional ethics.

Title	Code	Semester/Duration	Credits
PHYSICS FOR MEDICAL EQUIPMENTS AND INVESTIGATIONS	MLS-PHYS-115	1/Block 3 weeks	2

This is a three-week block course includes: (1) the basic principles of general physics important for the technical background of many medical equipments, and (2) physical chemistry, gas laws, and physics of light, and radiation.

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCES	MLS-COMP-116	1/Block 3 weeks	2

Most of the textbooks of medicine and allied sciences are available on CDs, in which a large volume of knowledge is saved and easily retrievable. There are many software packages

demonstrating methods and techniques in clinical skills including patient rapport in history taking, clinical examination, investigations and management. Students and teacher can access the internet for the unlimited sources of health information, both at their professional level and public level for health education. Students and future doctors are educators who have to prepare smart documents and presentations for the health team and profession at large. Knowledge of programmes like Word, Excel, and PowerPoint are indispensable for anyone: learner or teacher. Computer is important for students both in the developed or developing world, more so for the latter, who might not have inherited voluminous libraries in their colleges and have to utilize the virtual libraries available all over the world. Medical journal as hard copies are difficult to be owned by one institution, now almost all are available on-line for those who can use the computer efficiently. The course is intensive focusing on the basic principles of computer electronics and applications relevant to health science education. This is mainly on the hand-on experience in dealing with famous programmes like DOS, Word, Excel, PowerPoint, Access and Internet Explorer. The use of CDs is stressed covered as well as having e-mails and navigating the internet for health information including how to access medical journals, and communicate with scientists worldwide.

Reading material: College Notes Internet Sources of Medical Sciences.

Title	Code	Semester/Duration	Credits
BIOSTATISTICS	MLS-STAT-117	1/Block 2 weeks	2

This is a two-week block-course on basic statistics as applied to health, to include: (1) introduction to statistics, (2) probabilities, (3) data summary, (4) presentation; (5) measurement of central tendency; (6) interpretation of variation (dispersion), (7) population means, (8) normal distribution, (9) frequency distribution, (10) sampling techniques, (11) calculation and interpretation of the concept of confidence interval, (12) the concept of p-value and its interpretation, (13) the normal and skewed frequency distribution of biomedical data, and (14) apply the appropriate test of significance for a given data set and a given research methodology (using t test as an example).

Title	Code	Semester/Duration	Credits
GENERAL CHEMISTRY	MLS-GCH-118	1/Block 5 weeks	3

This is a five-week block course focus on basic general chemistry, organic chemistry and analytical chemistry. The course is designed to teach the students the basic and fundamentals of chemistry; also the practical section helps the students to learn the methods of measuring qualitative and quantitative methods. This section (both theoretical and practical) is regarded as an important base for preparing for future scientific studies, also the course covers some important concept of organic chemistry and physical chemistry, particularly as applied to the Medical and health sciences, It is designed to introduce the organic function-

al groups along with their structure, physical and chemical properties, reaction mechanisms, and how they are applied to biological systems.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICAL ETHICS	MLS-ETHI-121	2/Longitudinal	2

This is a two-week longitudinal course focus on, that includes: (1) a simple medical problem that emphasize the meaning and message of health, (2) health care delivery system in the country, (3) the role of the physician in health care, (4) role of other professional and administrative staff, (5) priority health problems, (6) concepts and principles of learning, (7) adult education and learning, (8) student centred and problem-based learning, (9) instructional techniques (lecture, small group etc), (10) student assessment methods, (11) holistic approach to patient's problems, (12) interdisciplinarity and partnership concepts, (13) curriculum development, (14) programme evaluation, (15) leadership and (16) professional ethics. Students are divided to groups to spend a week in a health facility (hospital theatre, hospital outpatient, health centre, various directorates and departments of Federal and State Ministries of Health, etc.). Meanwhile students are given discussion sessions on group dynamics and instructional methods. At the end of the course the groups present their field activity using a suitable audio-visual technique. Evaluation assesses the knowledge and attitudes of the students in these areas: health system, group dynamics and instructional methods.

Title	Code	Semester/Duration	Credits
BASIC BIOCHEMISTRY	MLS-BIOC-122	2/Block 5 weeks	3

A five-week block course module in Semester 1, to include: introduction organic compounds, classification of aliphatic and aromatic hydrocarbons, their properties and reactions; aldehydes and ketones, alcohols, phenols and ethers acids and amines benzenes and their derivatives; carbohydrates, lipids and proteins, vitamins and enzymes and coenzymes.

Title	Code	Semester/Duration	Credits
HUMAN GENETICS	MLS-GENE-123	2/Block 3 weeks	2

This is a three-week block course that covers the general principles of human genetics and its applications on health. The details include: (1) the biological functions of cells, (2) nucleic acids, (3) protein synthesis and its control, (4) mutation and genetic engineering and its practical applications in laboratory procedures and genetic diseases, (5) Mendel's theory in inheritance, (6) the bases of molecular genetics in man, (7) chromosomes, DNA, the steps of transcription of information contained in DNA helix, the role of RNA and ribosomes in manufacturing enzymes and protein, (8) classification of genetic disorders and mention their clinical significance, (9) outline of the main chromosomal abnormalities and how they occur and the congenital errors they lead to, (10) an attempt to recognize the normal and abnormal chromosome patterns and (11) the latent effect of chemical, physical and constitutional factors on embryological development.

Title	Code	Semester/Duration	Credits
ANATOMY	MLS-ANAT-124	2/Block -3 weeks	3

This is a three-week block course focus on the gross anatomy of human body organs, and systems including respiratory, cardiovascular, digestive, urinary, reproductive, endocrine and nervous with special emphasis on the interaction between these system and the major failures producing disease,structural and functional organization of the human body at the gross (macroscopic) level.,anatomical and medical terminology and basic information about the structural anatomy of the human,relationship between structure and function of the human body systems.

Title	Code	Semester/Duration	Credits
PHYSIOLOGY	MLS-PHYS-128	2/Block -4 weeks	3

This is a four-week block course focus on: physiology Components of the cells, tissues, organs and systems are described and discussed on basic physiology linked to systemic pathology to include (1) the Histological structure of each body system (2) Basic concept in systemic physiology (3) basic background to the principal physiological systems of the human body, includes the blood, body fluids, body temperature, buffer system, blood cells and action potential (sympathetic and parasympathetic), human physiology of respiratory, cardiovascular, digestive, urinary, reproductive, nervous system and endocrine system.

Title	Code	Semester/Duration	Credits
BASIC PROFESSIONAL SKILLS	MLS-SKIL-211+221+311+321	3,4,5 and 6/ Longitudinal	2 each semester

This is a two-hour weekly session during semester 3-6 to include: (1) communication skills of speaking, hearing, listening, recognizing strengths and weaknesses of close-ended and open-ended questions, non-verbal communications, establishing rapport, interview and be interviewed, dealing with a difficult patient, (2) taking brief relevant history from patients and relatives, specifically if the procedure requires certain patient fitness (e.g. bleeding tendencies.. etc), inspect superficial veins and carry out safe phlebotomy, palpable arteries, and accurately take pulse, and measure blood pressure, (3) take venous blood and recognize normal blood cells, basic blood tests for respiratory disease, safety measure in blood taking, administering IV fluids, (4) prepare sputum for detection of mycobacteria, (5) prepare sera and perform common microbiological, chemical, parasitological, hematological and histopathological examination and interpret findings (6) develop basic life support skills.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MLS	MLS-INTR-212	3/Block - 2 weeks	2

This is a two-week block course which introduces newly enrolled to the administrative professional and technical responsibilities of the medical laboratory technologists, the major technical areas are the basics and laboratory sciences: (1) parasitology (2) microbiology (3) clinical chemistry (4) haematology (5) histopathology, The professional competences include:(1) the organization of health system, hospital and laboratory (2) communication (3) legal and ethical issue (4) pursuit of certification, licensure and continuous professional development. The administrative duties include (1)managing a laboratory assuring quality,(2) purchase of equipments and supplies,(3) facilitating the flow of patients and servicess4) observing the economic burden and impact of infra structure, consumables and services on the patient, family, community, health provider and institutional stake holders.

Title	Code	Semester/Duration	Credits
BASIC PATHOLOGY	MLS-PATH-213	3/Block - 2 weeks	3

This is a three-week block on general pathology to include: (1) general histology, (2) Basic concepts of tissue injury, adaptation and death, and responses at cellular level (3) basic concepts in immunity,(4) physiology of white blood cells and the lymphatic system (5) general pathology of inflammation, hemodynamic disorders, neoplasia and abnormal cell growth.

Title	Code	Semester/Duration	Credits
BASIC HAEMATOLOGY	MLS-BHEM-214	3/Block - 5 weeks	4

This is a five-week block course which covers the basics of haematology and stages of haematopoiesis and the factors affecting it and the different types of anaemia. The study also includes the chemical structure, synthesis, functions and genetic defects of haemoglobin and types of white blood cells and laboratory methods of diagnosis acute and chronic leukaemias and the mechanism of blood clotting and coagulation and the laboratory methods of studying it. The course also covers the primary and secondary blood groups and their antibodies and their clinical use, precautions of blood transfusion and methods of detecting antibodies and determining the resulting complications of mismatching the different blood units. It also covers the organization of haematology laboratory and blood banks of Hospital including ways of collecting, transferring, registering the different blood samples and recording results and interpreting them and confirming quality control test. The course also includes student contribution to the different ways of preparing blood derivatives and identifying the possible complication on transfusing blood.

Title	Code	Semester/Duration	Credits
BASIC IMMUNOLOGY	MLS-IMUN-215	3/Block - 3 weeks	3

This is a three- week block course which presents detailed description of the structure of the immune system and its tissues and its cellular properties and functions and the chemical elements of the immune system especially cytokines. The course also includes defining innate and acquired immunity and its types and the different mechanisms of immune response,

hypersensitivity and its types, mechanisms and diagnosis. The course also gives detailed explanation of the immunity against microbial insult and methods of prophylaxis, serological and immunological diagnosis of microbial infection, immunodeficiency diseases and its diagnosis and the mechanisms of vaccine and toxoid action and the way of their preparation and utilization for prophylaxis and treatment. Students are also trained to using laboratory equipment related to immunological and biocellular diagnosis as ELISA and PCR.

Title	Code	Semester/Duration	Credits
SEROLOGY AND IMMUNOHAEMATOLOGY	MLS-SERO-216	3/Block - 2weeks	2

This a two-weeks block course is designed to give the student students are introduced to applied aspects of the immunological processes; clinically and serologically. Explanation of immunological basis of the clinical condition is presented and the common laboratory serological tests related to the immunological phenomena are also studied. The technologist should be able to perform routine serologic tests for specific disease entities, fluorescent procedures according to the established laboratory guidelines, Utilize appropriate samples and controls of serological kits, correctly perform the tests, according to the manufacturer's instructions, and report the findings,

Title	Code	Semester/Duration	Credits
CLINICAL BIOCHEMISTRY-1	MLS-CCHM-217	3/Block - 6 weeks	4

This is a six- week-block course that This is a three- week-block module that discusses the role of clinical chemistry in medicine and explains terms and units used in the subject. It focuses on the principle of reagent preparation and storage, identification and description of various types of specimens used in clinical
laboratories, with particular emphasis on the analysis of urine, plasma proteins, carbohydrates, enzymes and electrolytes.

Title	Code	Semester/Duration	Credits
BASIC HISTOLOGY AND HISTOLOGICAL TECHNIQUES	MLS-HIST-222	4/Block - 5 weeks	4

This is a five-week-block course. It covers: (1) the basics of tissue preparation for light microscopy, (2) cellular and tissue decay and basics of tissue fixation: types of histological cytological fixatives, (3) the processes of dehydration, clearing and embedding in paraffin wax and the other embedding media and (4) tissue sectioning. It also covers (5) the basics of cytological and histological staining. It describes (6) the non sectioning methods for processing tissues for light microscopy such as smears and imprints. It covers the histological characteristics of different body tissues.

Title	Code	Semester/Duration	Credits
MEDICAL ENTOMOLOGY & PARASITOLOGY	MLS-PARA-223	4/Block - 2 weeks	3

This is a two-week block course. Insects have tremendous potential for transmitting pathogens that cause disease in human and other animals. The disease-causing organisms include protozoa, viruses, bacteria, and worms. The deadliest disease worldwide is malaria which is vectored by mosquitoes, which can also transmit viruses (including those causing encephalitis) and filarial nematodes. Other vectors include flies and tics. It concerned with vectors' surveillance and control, considering the operational control personnel as one of the health team. There is special emphasis on: (1) insects and closely related arthropods that impact human health, (2) the life cycles of the vectors and parasites, their geographical distribution, ecology, and (3) the epidemiology, presentation and broad management and control of the diseases caused by them. These include parasites of the intestinal tract, blood-borne parasites and those found in other body sites.

Title	Code	Semester/Duration	Credits
BASIC MICROBIOLOGY	MLS-BMIC-224	4/Block - 4 weeks	4

This is a four week-course that covers the ways of specimen collection for clinical microbiology investigation and selecting the growth media and basics components and assuring vaccination and sterilization for microbial decontamination and the precautions to be followed when dealing with biologically hazardous sources in microbiology lab. It describes the proper procedures for selecting the proper specimen for anaerobic culture including: proper sampling, handling and investigation, determining samples adequacy, sterilization techniques, decontamination, identifying gram positive and gram negative and the methods of isolating pure growth.

Title	Code	Semester/Duration	Credits
PROTOZOLOGY	MLS-PROT-226	4/Block - 4 weeks	4

This is a four- week block course that reviews the basics of parasitology which includes classification of clinically important parasites: endoparasites, in addition to exoparasite and study of life cycles, and ways of occurrence of disease together with brief clinical description and determining the most suitable clinical specimens for laboratory diagnosis using the light microscopy and other laboratory tests. Students are practically trained to methods of diagnosis that include direct light and electron microscopic examination and centrifugation and immunoserological methods including ELISA. It includes also: the basics of using fixatives and sample processing, suitable methods of collecting worms, assessing parasite load, performing concentration method to examine eggs and parasites, preparation of blood smears and identify blood parasites, with special emphasis on prevention and diagnosis of malaria.

Title	Code	Semester/Duration	Credits
CLINICAL MICROBIOLOGY-1	MLS-CMIC-227	4/Block - 4 weeks	4

This is a four-week block course provides the student with theoretical and practical knowledge about different medically important pathogens including: Gram positive cocci and Gram negative cocci, and their laboratory isolation and identification procedures

This a four week block course provides the student with theoretical and practical knowledge about different medically important pathogens including: Gram positive cocci, Gram negative cocci and enterobacteriaceae. Furthermore the course covers their laboratory isolation and identification procedures.

Title	Code	Semester/Duration	Credits
CLINICAL BIOCHEMISTRY-2	MLS-CCHM-312	5/Block - 6 weeks	6

A six-week block course covers the chemical aspects of medical laboratory analyses that include: lipids, non-protein nitrogenous substances, electrolytes, enzymes, vitamins. Principle of different instruments such as flame photometer, ion selective electrodes, immunological techniques, chromatography, electrophoresis and automation. Introduction to endocrinology and CSF analysis. abnormal biochemical changes of lipids, enzymes and hormones with emphasis on their laboratory diagnosis.

Title	Code	Semester/Duration	Credits
HELMINTHOLOGY	MLS-HLMT-313	5/Block - 4 weeks	4

This is a four week-block module that review the basic of Helminthology which includes classification of clinically important metazoa : endoparasite, in addition to exoparasite and study of life cycles and ways of occurrence of disease together with a brief clinical description and determines the most suitable clinical specimens for laboratory diagnosis using the light microscope and other laboratory test.student are practically trained to method of diagnosis that include light microscope examination and immunological methods include ELISA and PCR.it include also the basic of using fixative and sample processing,suitable methods of collection worms,assessing parasite load performing concentration method to examine egg and parasites, preparation of blood smears and identify blood parasites with special emphasis on prevention and diagnosis of Schistosomasis.

Lynees.S, David A,Diagnostic medical parasitology.. 3rd edition 1997- Department of pathology and laboratory medicine, California. ASM PressWashington D.C.

Feances Talaska & MarshallBranett Lippincott Williams & WI kins A manual of laboratory and diagnostic tests.. 7th edition, Copy wright, 2004

Title	Code	Semester/Duration	Credits
CYTOLOGICAL AND HISTOPATHOLOGICAL TECHNIQUES	MLS-CYTO-314	5/Block -6 weeks	6

This is a six -week-block module. It covers (1) the basics of tissue preparation for light microscopy, (2)cellular and tissue decay and basics of tissue fixation :types of histological cytological fixatives.(3)the process of dehydration,clearing and embedding in paraffin wax and the other embedding media and (4)tissue sectioning. It also covers 5)basics of cytological and histological staining and the common techniques for special staining of cells and tissues and how

to prepare these stains.It describes (6) the non sectioninhg methods for processing cells and tissue for light microscopy such as smears and imprints,(7) training on equipments of histological techniques as tissue processors embeddig centres,rotary and automatic microtomes, multi-programme automatic linear and rotary slides strainers and coverslippers,(8) the basics of immunohistochemical staining, (9) performing immunohistochemical staining, (10) identifying results and(11) applying safety measures in histology laboratories.

Title	Code	Semester/Duration	Credits
CLINICAL MICROBIOLOGY-2	MLS-CMIC-315	5 /Block - 4 weeks	4

This is a four week-block course during which the basic microbiological techniques reviewed and focus on the study of : (1) enterobactereas, acid fast bacilli and atypical bacteria including their morphology, functional and biochemical structure,(2) method of causing disease (3) a brief clinical description of disease to decide on the most proper sample from which to isolate the organisms and study their requirements.(4) exclusion and inclusion criteria in the reception of the sample, (5) introduction to virology and mycology, and (6) methods of isolating pure growth from mixed culture.

Title	Code	Semester/Duration	Credits
PUBLIC HEALTH	MLS-PUBH-316	6/Block - 3 weeks	2

This is three week block course. They consist of theoretical studies on health system, the socioeconomic, psychological, behavioural and environmental factor related to epidemiology of disease and affecting its management, as well as primary health care. Most of the time is this course is devoted to weekly visits to health centres and villages trying to understand the health problems and help the local people and authorities in suggestions and involvement in solving them. This is possible through the study of epidemiology and health research, and the methods used in community medicine to investigate epidemics, maternal and child health, and control of endemic and communicable diseases.

Title	Code	Semester/Duration	Credits
LABORATORY MANAGEMENT AND QUALITY ASSURANCE	MLS-QUAL-317	6/Block - 3 weeks	2

This is a three - week - block module which focused on different issues, firstly the detailed attitudes, skills and knowledge essential for leadership, secondly management and change of management in the medical laboratory environment

Quality management is a philosophy aimed at integrating all organizational functions to focus on meeting customer needs and organizational objectives. It has been, with quality assurance, one of the most influential methods used in managing business processes. It has been incorporated as a vital component in the management systems of some of the world's most successful enterprises. The aim of this course is to equip participants to understand quality management and quality assurance so that they can make quality and continuous improve-

ment work to best effect in their clinical laboratories, also develop in students the ability to plan and implement a TQM programme, enable students to maintain an existing TQM programme, and allow students to gain an insight into the various quality standards practiced by major organizations.

Title	Code	Semester/Duration	Credits
ADVANCED HAEMATOLOGY	MLS-HEMA-318	6/Block - 6 weeks	7

This is a six- week block module during which the basic hematology is reviewed and the basic principles of hematological disorders are introduced, those are: anemias, leukemias, coagulopathies and their causes, diagnostic workup with emphasis or the laboratory procedures and how the laboratory results are interpreted and audited. The hematology laboratory setup will be outlined, at this stage.

Title	Code	Semester/Duration	Credits
MOLECULAR BIOLOGY AND TECHNIQUES	MLS-MLBT-319	6/Block - 3 weeks	3

This is a three week-block course that covers the general principles of molecular biology and its applications on health. The details include : (1)The biological functions of cells.(2)Nucleic acids,(3) Protein synthesis and its control, (4)Mutation And genetic engineering and its practical applications in laboratory procedure and genetic diseases.(5) the steps of DNA replication and transcription of information contained in DNA helix, the role of RNA and ribosomes in manufacturing enzymes and protein, (6) gene expression change during development(7)DNA damage and repair (8) molecular genetic of bacteria and viruses (9) regulation of cell growth (10) genetic susceptibility and resistance to disease.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO RESEARCH	MLS-RESH-326	6/ Block - 2 weeks	2

This is a two week-block course which focuses on the synthesis of professional knowledge, the skills and the attitudes in preparation for professional employment and life-long learning, Students are trained to perform a small research project on one topic of the medical laboratory sciences, that enables them to collect data, review literature, obtain results and discuss their findings in the form of presentations. The student should: (1) describe research methodology, write a meaningful proposal and generate a hypothesis, (2) collect up-to-date information on a particular topic, using proper sampling techniques, (3) execute the research and analyze the data collected, (4) discuss the results obtained with relevant literature and reach conclusions, (5) write down a research paper, and (6) present the findings in front of the class and discuss with colleagues and staff.

Title	Code	Semester/Duration	Credits
IN-SERVICE TRAINING	MLS-TRIN-327	6/Block - 3 weeks	2

This is three weeks -block course which focuses on exposure to actual training in health institution laboratories. It includes sending students to well equipped and served hospital to learn how MLS is practiced, and spend a four week apprentice period where they observe,present and perform actual service under supervision of senior technologist and physician. specific detailed log book are designed to assure standardized training.

Title	Code	Semester/Duration	Credits
PRIMARY CARE CLINICAL CHEMISTRY	MLS-CCHM-411	7/Block - 6 weeks	6

This is a six- week block course which considers : (1) the local laboratory procedures at the primary level, (2) the reasons that they are considerably less advanced than those used at hospital laboratories, (3) learning to perform an increasing number of laboratory tests apart from the routine analyses of ESR, haemoglobin, glucose and microscopic cell count, (4) learning how these additional test are done and the possible sources of errors, like the test strip analyses, analyses for monitoring a disease which might prevent or decrease complications, (5) accessing and harmonizing with the nearest hospital care, (6) applying continuous method assessment protocols for quality assurance under advisory boards, (7) observing continuity of primary care and keeping medical records, using the patient as his/her source of reference. Staff should seek opportunities for continuing education to optimize the use of clinical chemistry in primary care in order to keep total cost of primary care down.

Title	Code	Semester/Duration	Credits
ANAEMIAS AND HAEMOGLOBIN DISORDERS INVESTIGATIONS	MLS-HAEM-411	7/Block - 8 weeks	8

This is an eight-week block course which deals with clinical and laboratory presentations of iron deficiency, sideroblastic, megaloblastic anaemias, autoimmune haemolytic anaemias as well as anaemias due to chronic disease. It deals with diagnostic features of the inherited genetic disorders in which either the quality or quantity of haemoglobin is abnormal, among them the most common are sickle and thalassaemia. Students should know the follow up protocols of patients with such illnesses and outline the therapeutic approaches to each of them.

Title	Code	Semester/Duration	Credits
CYTOLOGY AND CYTOLOGICAL TECHNIQUES	MLS-HIST-411	7/Block - 6 weeks	5

This is a four week module which covers: (1) a review of the theoretical and practical aspects related to cell cycle, (2) cell renewal, replication, proliferation and neoplasia, (3) the chemical factors related to carcinogenesis, (4) classification of cancers and stages of its formation and different histological features, (5) the methods of getting cells for microscopical examination including desquamated cells, needle aspirations and biopsies,(6) methods of laboratory diagnosis of different tumors including light and electron microscopy and (7) the immunohistological and cytological methods.

Title	Code	Semester/Duration	Credits
IMMUNOLOGICAL TECHNIQUES	MLS-MICR-411	7/Block - 6 weeks	6

This is a six- week-block course which: (1) reviews basic immunology (structure and function of the immune system) and (2) addresses the immunological defects and disorders including: (a) hypersensitivity reactions, (b) autoimmune disease, (c) transplantation rejection, and (d) immunodeficiency disorders. It includes: (3) tumour immunology, (4) antigen presentation, (5) major histocompatibility complex molecules, (6) detection of lymphocytes and (7) complement deficiency.

Title	Code	Semester/Duration	Credits
PARASITOLOGY AND IMMUNOPARASITOLOGY	MLS-PARA-411	7/Block - 8 weeks	8

This is an eight- week-block course that: (1) reviews the basic parasitology and (2) introduces clinical methods in managing problems of patients with parasitic disease, starting with (a) the medical history and (b) physical signs, (c) relevant laboratory investigations, correlating that with patient conditions, and (d) studying the appropriate parasitic treatment and effects of various medications on the investigative profile of the patient. The module includes immunoparasitology a new term which was addressed as malaria and leishmania cell biology and immunology, molecular parasitology and mammalian genetics. It concentrates on: (1) molecules and processes involved in immunity and drug-resistance of parasites like malaria and leishmania, and expanded to include *Toxoplasma gondii*, an important pathogen in AIDS patients, (2) genome mapping of parasites and (3) immunogenicity trials of vaccines.

Title	Code	Semester/Duration	Credits
ADVANCED CLINICAL CHEMISTRY	MLS-CCHM-412	7/Block -6 weeks	6

This is a six- week course module which offers detailed study of the (1) common measurement methods used in laboratories for carbohydrates, amino acids, proteins, lipids, (2) liver function tests, (3) kidney function tests, (4) blood gases and pH, (5) digestive system and endocrine glands and the diseases associated with them, (6) enzyme concentration ANF, LDH and CK and their relation to angina pectoris and heart disease, (7) blood calcium level, (8) blood iron level, (9) serum amylase concentration, (10) amino acids, (11) clinically relevant hormones measurement by various methods, G6PD, (12) concentration of trace amounts of clinically relevant metals, (13) analysis of kidney and gall bladder stones, (14) analyses of cerebrospinal fluid biochemical components, (15) concentration of the types of lipoproteins, (16) analyses of seminal fluid, (17) PCR, and (18) dealing with automatic equipment's and those using dry chemical kits.

Title	Code	Semester/Duration	Credits
LEUKAEMIAS AND LYMPHOMAS INVESTIGATIONS	MLS-HAEM-412	7/Block - 6 weeks	6

This is a six-week block course, which addresses two major haematological disorders. Students are expected to define, classify, identify risk factors, outline clinical features and diagnostic algorithms, perform and discuss laboratory investigation and outline management for leukaemias and lymphomas. They should detail the description and recognize the microscopic features of all types before treatment, and the times of remissions and exacerbations.

Title	Code	Semester/Duration	Credits
HISTOPATHOLOGICAL TECHNIQUES	MLS-HIST-412	7/Block - 7 weeks	7

This is a seven-week block course during which basic techniques done in Module MLS-CY-TO-315 are reviewed. The student carries out tissue preparation for light microscopy, using the appropriate tissue fixation from the various types of histological cytological fixatives, through the processes of dehydration, clearing and embedding in paraffin wax and the other embedding media and tissue sectioning. He/she should apply cytological and histological staining and the common techniques for special staining of cells and tissues and how to prepare these stains. The module also covers non sectioning methods for processing cells and tissues for light microscopy such as smears and imprints. Towards the end of this course students are expected to use and maintain the equipment of histological techniques as tissue processors, embedding centres, rotary and automatic microtomes, multi-programme automatic linear and rotary slide stainers and cover slippers, the basics of immunohistological staining, performing immunohistological staining and identifying results, and apply safety measures in histology laboratories.

Title	Code	Semester/Duration	Credits
BACTERIOLOGICAL TECHNIQUES	MLS- MICR- 412	7/Block - 8 weeks	8

This is an eight-week block course that covers the identification methods of Bacteria that cause infections in different body systems. It include the diseases, etiological agents, specimens collection, transportation and preservation and laboratory investigations of urinary tract infections, respiratory tract infections, skin infections, genital tract infections, central nervous system infections, blood circulation infections, gasterointestinal tract infections, water and milk examinations, methods of bacterial typing, methods of preservation of lab strains.

Title	Code	Semester/Duration	Credits
TROPICAL DISEASES AND PUBLIC HEALTH	MLS-PARA-412	7/Block - 8 weeks	8

This is an eight-block course which focuses on the study of parasitic tropical diseases in both theoretical and practical instructions. Such diseases are prevalent in tropical and subtropical regions, the methods of controls are more or less environmental associated with poor agricultural communities, and no vaccine is available so far. Malaria, trypanosomiasis, leishmaniasis, schistosomiasis, lymphatic filariasis and onchocerciasis are all common in Sudan and have to be reviewed using public health approaches and strategies of control including use of safe water, draining wetlands, application of insecticides, use of mosquito nets, development and use of vaccination, subsidizing treatment of cases, assist in the economic development of in the endemic regions.

Title	Code	Semester/Duration	Credits
CLINICAL CHEMISTRY AND PUBLIC HEALTH	MLS - CCHM - 413	7/Block - 6 weeks	6

This is a six-week block course which discusses the controversial issue of relationship between the need and availability of clinical chemistry services. It requires student to study data from African countries and less-developed countries of the Western Pacific regions on the status of disease burden and the situation of available clinical chemistry research, collect local data on the services provided to rural health care facilities in the under-served areas of the country and suggest methods of introducing such servicing considering cost and priorities.

Title	Code	Semester/Duration	Credits
HAEMOSTASIS AND BLEEDING DISORDERS INVESTIGATIONS	MLS-HAEM-413	7/Block - 4 weeks	4

This is a four-week block that covers the: (1) factors that control haemostasis, (2) natural mechanisms of blood clotting, (3) clotting antagonists, (4) carrying out test necessary to reveal the platelet count and functions, (5) investigations and test necessary to diagnose cases of bleeding tendencies, (6) investigations and examinations necessary to diagnose cases of blood clotting, (7) studying prothrombin and fibrinogen, (8) explaining the mechanism of platelet clot and its various components, (9) blood sampling methods, and (10) performing the necessary investigations to follow patients of anti-clotting clinics.

Title	Code	Semester/Duration	Credits
IMMUNOHISTOCHEMICAL TECHNIQUES	MLS-HIST-413	7/Block - 3 weeks	4

This is a three- week block course to study the localization of proteins in cells of a tissue section, making use of antibodies binding specifically to antigens in biological tissues, apply immunohistochemical staining to diagnose abnormal cells such as those found in cancerous tumours, find out specific molecular markers characteristic of important cellular events like cellular proliferation or death, understand the localization and distribution of biomarkers in biological tissues, and the method of visualizing antibody-antigen interactions like colour or fluorescence (immunofluorescence) The module includes practical application of the direct and indirect immunohistochemical techniques and diagnostic immunohistochemical markers. This may include directing therapy of tumours through targeting hormone receptors and exploiting monoclonal antibodies.

Title	Code	Semester/Duration	Credits
MYCOLOGY	MLS- MICR- 413	7/Block - 4 weeks	4

A four-week block course to study of the groups of fungi and yeasts regarding their classifica-

tion, morphology, structural physiology, biochemical functions, methods of inducing disease. It includes brief clinical description of the diseases resulting from fungi, so as to decide on the most suitable samples from which to isolate the organisms and study their growth requirements.

Title	Code	Semester/Duration	Credits
MEDICAL ENTOMOLOGY	MLS-PARA-413	7/Block - 2 weeks	2

This is a two- week block course concerned with the (1) study of insects and arthropods (vectors) that have an impact on human health, (2) the transmission of protozoa, viruses, bacteria and worms, that mainly affecting the blood and intestinal tract, (3) study of the habitat, geographical distribution and morphology of vectors, and (4) the surveillance and control methods used at the personal or environmental levels.

Title	Code	Semester/Duration	Credits
EVIDENCE BASED PRACRTICE IN MEDICAL LABORATORY SCIENCES	MLS-CCHM-414 MLS-HAEM-414 MLS-HIST-414 MLS-MICR-414 MLS-PARA-414	7/Block - 2 weeks	2

This is a two- week-block course that cover the clinical approach of evidence-based laboratory technology as a means to deliver appropriate care in an efficient manner to individual patients. The student should explain: (1) why do we need it. (2) How to integrate research evidence? (3) How to ask the right questions? (4) Searching the literature, (5) critical appraisal of the literature, (6) nature of qualitative research and how to appraise it, (7) systematic review, (8) meta-analysis, (9) developing evidence-based culture and (10) how clinical evidence can change laboratory practice.

Title	Code	Semester/Duration	Credits
ELECTRON MICROSCOPY TECHNIQUES	MLS-HIST-415	7/Block - 2 weeks	2

A two- week block course that includes the theoretical aspects of transmission and scanning electron microscopes noting the similarities and differences, and the methods of manual preparation of biological specimens for examination by each. This includes preparing fixatives such as glutaraldehyde, paraformaldehyde and metastaining with osmium tetra-oxide, dehydration, clearing and embedding in resins, types of resins, ultra-microtomy, staining. It covers the technique of using the ultra-microtome, producing ultrathin sections and staining with uranium acetate, and lead citrate. It involves training students to equipment for automatic preparation of histological and cytological specimens for electron microscopy and use of the automatic stainers. It also includes preparation of photographs, the common immunocytological staining methods for electron microscopy and applying safety measures in electron microscopy units.

Title	Code	Semester/Duration	Credits
CLINICAL CHEMISTRY EQUIPMENTS	MLS-CCHM-421	8/Block - 6 weeks	6

A six-week block course that presents a description of the basics of automatic analysis of clinical analytical chemistry laboratories including technical study of the different apparatuses, their uses that includes the electronic principles of operating them and affecting the interpretation of results. This includes: flame spectrophotometer, spectrophotometers, immunoflourescnce, fast adherence, interpreting mononucleosis test, Western blot test and interpreting the results, immunoblot analysis with care on patients specimens using automatic chemical analyzer, kinetic analyses of blood and other body fluids, immune diffusion osmotic measurement equipment, operating electrophoresis, ELISA and interpreting the results, PCR equipment and interpreting the obtained results, operating gas analyzers and chromatography. The technologist should be aware to identify the equipment problem before starting the test and keep inventory of manufacturer and maintenance details for each equipment.

Title	Code	Semester/Duration	Credits
BASIC HAEMATOLOGICAL DIAGNOSIS	MLS-HAEM-421	8/Block - 6 weeks	6

A six- week block course that describes the essential aspects of diagnosing hematologic disease, through an outline of clinical features and diagnostic laboratory criteria which have been detailed in earlier courses. It includes more recent sophisticated (molecular) diagnostic techniques in haematopathology, immunocytochemistry and immunophenotyping, in addition to the use of radioisotopes in the haematology laboratory, or other major emerging technologies before the student is graduated. It involves preparing blood and blood components for transfusion as well as selection of appropriate, compatible components for transfusion. It includes screening of potentials donors and recipients for unexpected antibodies and to select blood which lack offending antigens. It addresses the immunological aspects of umbilical cord blood transplantation and bone marrow transplantation. The diagnostic conclusions should be always audited by a qualified pathologist and/or clinician supervising the technologist.

Title	Code	Semester/Duration	Credits
CYTOGENETICS AND MOLECULAR TECHNIQUES	MLS-HIST-421	8/Block - 6 weeks	6

This is a six - week block course, which goes beyond the introduction in Module MLS-GENE-126, in semester 2. The students should do by themselves the molecular techniques in cytogenetics, utilizing advanced laboratory facilities. This is a preparation for practice in in-service training during this semester.

Title	Code	Semester/Duration	Credits
VIROLOGY TECHNIQUES	MLS- MICR-421	8/Block - 6 weeks	6

A six-week block course that deals with studying the groups of different viruses regarding definition, morphology, structure, replication, vital functions, classification, and ways of causing disease. A brief description of the clinical entities (e.g. hepatitis, influenza, he1pes, polio-AIDs, etc) is needed to specify the type of specimens taken for laboratory diagnosis. It includes isolating the viruses in cell cultures, and studying the disease effects on cells, tissues, organs and systems of the body. It covers the use of electron microscopy, and serological tests used to identify the viruses (complement fixation, direct fluorescence, PCR etc). Studying the routes of infection is important for disease control and prophylaxis.

Title	Code	Semester/Duration	Credits
BASIC PARASITOLOGICAL DIAGNOSIS	MLS-PARA-421	8/Block - 6 weeks	6

A six-week block module that reviews the basic and clinical parasitology in Modules MLS-PARA-223 and MLS-PARA-412, and introduces specific disease problems with clinical history for the students to make appropriate choice of laboratory investigations, show competence in carrying out these investigation through correct procedures and techniques and interpret the results and advice the patient on further steps of management in close contact with the supervising pathologist and/or clinician. The modern diagnostic molecular and immunological techniques should be included in student choice of investigation with realistic economic considerations and patient's capabilities and safety. The diagnostic conclusions should be always audited by a qualified pathologist and/or clinician supervising the technologist.

Title	Code	Semester/Duration	Credits
BASIC CLINICAL CHEMISTRY DIAGNOSIS	MLS-CCHM-422	8/Block -6 weeks	6

This is a six-week block course that reviews the basic Module MLS-CCHM-312 and discusses the role of clinical chemistry in diagnosis of specific disease entities, through clinical survey of patient problems and choice of appropriate investigation of liver function, renal function, blood gases or blood chemistry and provide interpretation of the laboratory results.

The module includes a review of enzyme classification, basic molecular structure, functions and clinical importance. It also includes the nomenclature, sources, classes, functions and methods of hormonal assays. It outlines the immunological techniques of investigating and diagnosing disorders of enzymes and hormones.

Title	Code	Semester/Duration	Credits
FIELD TRAINING IN CLINICAL HAEMATOLOGY AND BLOOD BANKING	MLS-HAEM-422	8/Block - 6 weeks	6

A six- week block course based on the community or hospital using a logbook and carrying out. Supervised haematological examination and recording results. The contents of the logbook will

be designed according to the common tests used in the country. The list should include testing skills related to prevention and control of blood diseases, as seen by experts from the National Programmes in the Ministry of Health.

This course covers the basis and practice of blood banking and blood transfusion. The course reviews understanding blood group immunology, precautions of blood transfusion and methods of detecting antibodies and determining the resulting complications of mismatching the transfused blood. It also covers the organization of haematology laboratory and blood banks in hospitals including methods of collecting, transferring, registering blood samples and recording results and interpreting them, assuring quality control of all tests. The student assumes active role in preparing blood derivatives.

This module may also include a revision immunohaematology, which deals with preparing blood and blood components for transfusion as well as selection of appropriate, compatible components for transfusion. It includes screening of potentials donors and recipients for unexpected antibodies and to select blood, which lack offending antigens. It addresses the immunological aspects of umbilical cord blood transplantation and bone marrow transplantation.

Title	Code	Semester/Duration	Credits
BASIC HISTOPATHOLOGICAL DIAGNOSIS	MLS-HIST-422	8/Block - 6 weeks	6

A six- week block course concerned with the morbid anatomic and histological changes resulting from disease, including light microscopic appearance of inflammation, coagulation, consolidation, granulation, autolysis, tissue necrosis. It is the science of differentiating microscopically between normal and abnormal epithelial, connective, muscular and nervous tissues, the Microscopical characteristics of the common diseases of different body systems and the Microscopical manifestations of wound and bone healing and the basics of routine, special, immunological staining for examining diseased tissues. A technologist should name the lesions and diseases in various body regions, describe in detail the Microscopical appearance of acute and chronic inflammation, appearance of necrosis and fibrosis, recognize the value and technical limitations of needle biopsies and the procedures to reach a diagnosis, and correlate pathological history, radiographs and gross and Microscopical features to suggest a diagnosis.

Title	Code	Semester/Duration	Credits
INFECTION CONTROL	MLS-MICRO-422	8 /Block - 6 weeks	6

A six- week block course that deals with sources of infection in the community and health institutions, in particular as related to medical/facilities, the measures of prevention, disinfection and sterilization, understanding the contagious and contaminating materials and the organisms likely to be transmitted from contacts with such material, identifying the potential sources of infection in laboratory and contamination of specimens, and appreciation the role of personal and laboratory safety measures.

Title	Code	Semester/Duration	Credits
FIELD TRANING IN PARASITOLOGY TECHNIQUES AND INFECTION CONTROL	MLS-PARA-422	8/Block - 6 weeks	6

A six- week block course based in the community or hospital using a logbook and carrying out. Supervised parasitological examination and recording results. The contents of the logbook will be designed according to the common investigations in the country. The list should include testing skills related to prevention, eradication or control of parasitic infections, as seen by experts from the National Programmes in the Ministry of Health.

Title	Code	Semester/Duration	Credits
LABORATORY MANAGEMENT AND ECONOMICS	MLS-CCHM-423 MLS-HAEM-423 MLS-HIST-423 MLS-MICRO-423 MLS-PARA-423	8/Block - 2 weeks	2

This two- week block course, which presents detailed description of clinical laboratories management and planning regarding specimen collection, transport and storage and performing the different quality control tests beside studying communication means and analysis and recording the provisional results. The module also includes applying quality control to equipment and adopting safety procedures of clinical laboratories. The details include a short course on general management, administrative organization, laboratory forms, and written procedures for collecting and transporting specimens, protocols of safety, quality control tests, and all economical studies to ensure the feasibility and utilization of services and their cost for the public and owners, especially in complete or partial research laboratories.

Title	Code	Semester/Duration	Credits
HEALTH INFORMATION SYSTEM	MLS-CCHM-424 MLS-HAEM-424 MLS-HIST-424 MLS-MICR-424 MLS-PARA-424	8/Block - 2 weeks	2

This is a two- week block course, which introduces health information system (HIS) - terminology, classification and setup. The students need to spend sometime in the relevandepartment in the Federal and State Ministry of Health to see how the data collected and compiled. It includes also the internet sources of Health information system; they should prepare a critique of the current systems and suggest a design or protocol for better organization and computation of the laboratory data collected.

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT	MLS-RESH-425	8/Longitudinal	6

A four- week FREE block module reserved to writing a short thesis, which can be a review or experimental research. No formal didactic timetable is needed since students had a previous course on research methodology. Students will contact their supervisors to decide on the topic title, and advise students to start and progress in writing. The cost of research and examinations is the responsibility of the candidate

FACULTY OF

PHYSIOTHERAPY

UNDERGRADUATE
& GRADUATE
PROSPECTUS

VISION AND MISSION

The Faculty of Physiotherapy National university -Sudan strives towards developing the highest standards of academic professional excellence in physiotherapy. The various parts of this programme aim to produce ethically respon sible innovative, critically thinking professional technologist committed to meeting the health and developmental needs of all communities in the Sudan and the rest of the world, appropriately and efficiently. The programmed teach the students how to learn and continue as lifelong learners in physiotherapy.

The faculty aims to be the most respected educational institution of physiotherapy, as evidenced by high quality of premises, up-to-date administration and governance, job- and research-directed instruction, quality of graduate and their ethical, professional and scholarly contribution.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Physiotherapy, has to:

1 - Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.

3 - Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Physiotherapy.

4 - Pay the published fees: 23,000 SDG or US $ 4,000 [international students] (2018).

CAREER ADVICE

Students qualified with this Bachelor degree pass through a track decreed by the Health Professions Council. They are accredited as physiotherapy technicians, and may pursue postgrad studies in the micro-specializations of the profession, or obtain master's degree or PhD to qualify for university teaching staff, in colleges of physical therapy and rehab. Diploma students study six semesters (about three years) or the equivalent of 80-90 credit hours, sharing with Bachelor-track students the two phases of university requirements and internship. The stage of theoretical study of basic therapeutic science is limited to two semesters only. Students qualified with this Diploma pass through a track decreed by the Health Professions Council, and are accredited as assistant physiotherapist. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

International graduates can follow the same track if they preferred to stay in the Sudan, but may also start their registration and internship in their own countries or residence.

FACULTY OBJECTIVES

The objectives of the Faculty of Physiotherapy National University are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National University philosophy and message.
2. Graduate a physiotherapy professional at the technician (Dip PT) and Technologist (B.Sc PT) levels with strong community orientation and ethical components.
3. Contribute to community development through health services pro vided in its own health institutions and other institutions co-operating with it, through the following: (a) partnership in designing health programmed and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) Contribution in continuous education through short and long term courses, to improve efficiency of health workers, and (c) Provision of essential equipments and supplies to improve quality of services, through partnership with the Ministry of Health.
4. Strengthen medical and health research in physical therapy and related profession, making use of the National University accessibility and communication privileges.
5. Strengthen medical and health research, making use of the Universitys accessibility and communication privileges.

CURRICULUM OBJECTIVES [Characteristics of the physiotherapy graduate]

A graduate of the National university Physiotherapy Faculty Curriculum should be able to:

1. Adopt the strategies of the university and abide by its objectives and rules stated in its constitution.
2. Observe in his/her practice, the health professional ethics which agree with the Nation's values, beliefs and norms (as stated by Sudan Medical Council, and Sudan Allied Health

Professionals Council), and maintain good and

3. Honest relations with his/her patients, their families, his/her colleagues across all sectors involved in health.
4. Designing the treatment plan and manage cases of physical disability and pay attention to other health problems prevalent at the level of the individual, family or society, with special emphasis on the nutritional and environmental problems common in developing countries, and plays an active role in health promotion.
5. Integrate basic, community, clinical and physical sciences in solving the individual physical problems
6. Use scientific knowledge to design the therapeutic plan and management of problems man aged through physiotherapy, according to known methods of problem solving and integration, and explains the scientific structural (anatomical), functional (physiological, biochemical), morbid (microbiological, pathological),and therapeutic (physical) background related to the problems.
7. Manage relevant emergencies, and decide and act properly on cases needing referrals to specialized centres or personnel
8. Accepts to work in all settings according to needs, and act to improve health
9. Service delivery systems both quantitatively and qualitatively.
10. Encourage community participation and act in recruiting various sectors in defining health and health-related problems, planning and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices.
11. Adhere to “health team” approach, acting as an efficient member, and ensuring both effectiveness and homogeneity among the members.
12. Administer a physiotherapy and physical fitness “unit” or “centre” efficiently according to scientific, medical, statistical, economic and legal bases.
13. Continue to consider elements of efficiency, costing and economic implications in his/her diagnostic and therapeutic choices.
14. Acquire the skills of teaching, learning and communication efficiently to carry out his/her duties in health education and in winning the confidence of patients and their families and societies.
15. Acquire the skills of self education (self-directed learning), and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/her colleagues in the health team.
16. Carry health or health-related research, alone or with a health team, using scientific methods known in such activities.
17. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career, and skills of computer-assisted presentation.
19. Acquire postgraduate qualification in the discipline of his/her choice, recorganizing the needs of the society for certain specialties, particularly general practice,

TIMETABLE

Semester 1 [28 CHs- 15 weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Orientation		-	-	-	-	-
2	Islamic Studies -1	ISLAM-111	Long.	2	-	-	2
3	Sudanese Studies -1	SUDN-110	Long.	2	-	-	2
4	Biostatistics	ME-STAT-117	Long.	2	-	-	2
5	Arabic Language-1	ARAB-112	Long.	2	-	-	2
6	English Language -1	ME-ENG-113	Long.	2	-	-	2
7	Islamic Studies -2	ISLAM-121	Long.	2	-	-	2
8	Sudanese Studies -2	SUDAN-120	Long.	2	-	-	2
9	Arabic Language -2	ARAB-122	Long.	2	-	-	2
10	Introduction to Medical Ethics	ME-ETHIC-313	Long.	2	-	-	2
11	Medical Terminology-1	PT-TERM-125	Long.	2	-	-	2
12	English Language -2	ME-ENG-123	Long.	2	-	-	2
13	Computer Science -1	ME-COMP-116	Long.	1	-	1	2
14	Computer Science -2	ME-COMP-124	Long.	1	-	1	2
15	Physics for Medical Equipments & Investigation	ME-PHYS-115	Long.	2	-	-	2
			15	26		2	28

Examination of longitudinal courses (+re-sits) 1weeks

Courses or examinations for late comers and failures

Semester 2 [19 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Introduction to Medicine & Medical Education	ME-EDU -114	Long.	2	-	-	2
2	Basic Biochemistry	ME-BIOCH-118	Long.	2	-	-	2
3	Genetics & Molecular Biology	ME-GET-119	Long.	2	-	-	2
4	Behavioral Science	ME-BEHAV-129	2	2	-	-	2
5	Human Body Structure and Function	PT-NAT-126	5	3	-	2	5
6	Physiotherapy services in community & hospitals	PT-SERV-127	3	1	-	1	2
7	Musculoskeletal System	PT-MSK-128	5	2	-	2	4
			15	14	-	5	19

Examination of longitudinal courses (+re-sits) 2 week

SUMMAR 1: Medical records and data collection (ME-SUM-131) 2 CHs

Elective (E-132): A 1000 -word report on “Internet Sources of Health Sciences” 1CH

FIRSt YEAR PROGRAMME EVALUATION

Semester 3 [21 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills (1)	PT-SKILL-211	Long.	-	-	2	2
2	Medical terminology (2)	PT-TERM-217	Long.	3	-	-	3
3	Gymnastics	PT-GYM-316	Long.	1	-	1	2
4	Kinesiology and biomechanics	PT-KINS-224	Long.	1	-	1	2
5	Cardiovascular & respiratory system	PT-CVRS-213	6	3	-	2	5
6	Nervous system & special senses	PT-NEURO-218	5	3	-	2	5
7	Clinical & sports message	PT-MASS-223	Long.	1	-	1	2
			18	12	-	9	21

Examination of longitudinal courses (+re-sits) 1 week

Semester 4 [17 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-2	PT-SKIL-221	Long.	-	-	2	2
2	Biochemistry & physiology of exercise	PT-BIOCHEM-222	Long.	2	-	-	2
3	Ergonomics	PT-ERGO-226	Long.	1	-	1	2
4	Posture and posture education	PT-POST-228	Long.	2	-	-	2
5	Therapeutic exercise	PT-EXER-225	Long.	1	-	1	2
6	Physical education principles	PT-PEPR-227	Long.	2	-	-	2
7	Principles of disease	ME-DIS-212	5	4	-	1	5
			18	12	-	5	17

Examination of longitudinal courses (+re-sits) 2 week

SUMMAR 2: Research methodology and scientific writing (ME-SUM231) 2 CHs

Elective (E232): Draw a map of health services in one Mu’tamadiya 1 CH

SECOND YEAR PROGRAMME EVALUATION

Semester 5 [14 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Professional skills-3	PT-SKILL-311	Long.	-	-	2	2
2	Sport injuries and therapy	PT-SPORT-314	Long.	1	-	1	2
3	Electrotherapy & PT equipments	PT-EQUIP-315	Long.	2	-	2	4
4	Rehabilitation	PT-REHAB-317	Long.	1	-	1	2
5	Orthopedics physiotherapy	PT-ORTHO-326	Long.	1	-	1	2
6	Community medicine and public health	ME-COM-312	2	2	-	-	2
			18	7	-	7	14

Examination of longitudinal courses (+re-sits) 1 weeks

Repeat courses or examinations for late comers and failures.

Semester 6 [14 CHs- 18 weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Neurological physiotherapy	PT-NEURO-322	Long.	2	-	2	4
2	Pediatrics physiotherapy	PT-PED-323	Long.	1	-	1	2
3	Physiotherapy for intensive care patients	PT-ICU-324	Long	1	-	1	2
4	physiotherapy in cardiorespiratory clinic	PT-CVRS-325	Long.	1	-	1	2
5	Geriatrics care	PT-GER-321	Long.	1	--	1	2
6	Basic pharmacology	PT-PHARMA-318	Long.	2	-	-	2
			18	8	-	6	14

Examination of longitudinal courses (+re-sits) 2 weeks

Semester 7 [14 CHs- 18 weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Hydrotherapy and SPA training	PT-HYDRO-415	Long.	1	-	1	2
2	Research Methodology	PT-RESE-418	2	2	-	-	2
3	Ophthalmology and PT training	PT-OPTAL-413	2	1	-	1	2
4	Health economics and hospital management	PT-HM-411	2	2	-	-	2
5	Prosthetics and orthotics	PT-ORTH-417	4	2	-	2	4
6	Physiotherapy and imaging	PT-RAD-416	2	2	-	-	2
7	ENT physiotherapy	PT-ENT-414	2	1	-	1	2
8	General PT lab and electrotherapy	PT-LAB-412	4	-	-	4	4
			18	11	-	9	20

Examinations (1 weeks)

Semester 8 [14 CHs- 13 weeks]:

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Case work up and presentation	PT-CASE-423	5	2	-	2	4
2	Training In PT Lab and electrotherapy	PT-ET-422	4	-	-	4	4
3	Primary health care	PT-PHC-421	4	1	-	1	2
4	Graduation project	PT-GRAD-424	Long.	-	-	4	4
			13	3	-	11	14

Examinations (1 weeks)

IMPORTANT

It is the students' responsibility to find out the methods of acquiring Competencies listed in the objectives of each course. Staff is available to guide them. Each student is assigned an academic and social advisor who should be consulted and given all information about a student's academic and social problems, if there are. Even excellent students need their advisors for elective supervision and career choices

COURSE OUTLINE

Detailed behavioural objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included below:

Semester 1, Preliminary Courses (University Requirements)

Title	*Code*	*Semester/Duration*	*Credits*
ISLAMIC STUDIES	ISLAM-111+121	1and 1/Longitudinal	2+2

This is a National Requirement compulsory to all Muslim Students, which includes two courses: 111 in Phase 1, and 121 in Phase 2. Their contents are: {1) the recitation of two Sutras of the Holy Quran, which introduces a lot of behavioral and ethical issues for mankind as well as for Muslims, (2) the basic sources of religious thought and religious groups, {3) the principles of deriving a religious rule relevant to the medical profession, and (4) review the Fatwa's likely to come as a request from the community to the health team member working in that community, and all problems that are may arise from emerging issues that require ethical discussion, that leads to better understanding between individuals in groups, to help living in a peaceful and constructively save environment and society.

Title	*Code*	*Semester/Duration*	*Credits*
SUDANESE STUDIES -1 & 2	SUDN-110+120	1and 1/Longitudinal	2+2

This is a National Requirement compulsory to all Students, which includes two courses: 110 in Semester 1, and 120 in Seems 2. It includes: (1)the geographic profile of the Sudan, (2) classification of the population and their distribution all over the country, (3) discussion and comparison

of the various historical era of the Sudan, (4) main features of Sudanese economy, (5) educational policies and administrative rules in the country, (6) political systems that has governed the Sudan, (7) the legal system, (8) Sudan identity and culture, (9) elements of unity and harmony in social fabric, and (19) issues of diversity and cultural unity.

Title	Code	Semester/Duration	Credits
BIOSTATISTICS	ME-STAT-117	1/Longitudinal	2

A Longitudinal course basic statistics as applied to health, to include: introduction to statistics, probe abilities, data summary, presentation; measurement of central tendency; interpretation of variation (dispersion), population means, normal distribution; confidence interval, frequency distribution, sampling techniques, calculation and interpretation of the concept of confidence interval, the concept of p-value and its interpretation, the normal and skewed frequency distribution of biomedical data, and apply the appropriate test of significance for a given data set and a given research methodology (using t test as an example).

Title	Code	Semester/Duration	Credits
ARABIC LANGUAGE-1& 2	ARAB-112+122	1and 1/Longitudinal	2+2

This is a National Requirement compulsory to all Arab Speaking Students, which includes two courses: 112 in Phase 1, and 122 in Phase 2. It includes: (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, and (5) principles of translation of scientific text between Arabic and English languages.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE-1& 2	ME-ENG-113+123	1and 1/Longitudinal	2+2

The sources of health information in the World are still in English. The Internet navigation to obtain information is basically in English. Some of the patients, attending clinics in Sudan, may only speak English language, especially with open-up of borders with economic development and of globalization.

Passing the English language examination is an essential entry requirement to universities in Sudan. The general objectives of this course include: {l)correct pronunciation of medical terms, including those related to health services in the country, (2) correct reading and showing understanding of texts from medical books, (3) expressing one's self in good English describing his daily activities, career ambitions, present problems in health and current attempts at management, and (4) translating some pieces from English to Arabic, and three others from Arabic to English, both sets from medical literature.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICAL ETHICS	PT-ETHIC- 313	1 / Longitudinal	2

The student should show an understanding of the (1) history of medicine; before and during the Islamic era, (2) the role of the Moslem scholars in the practice of medicine, research and medical ethics, (3) the milestones of medical education in the Islamic era, (4) the fight of illness and the sick, the religious regulations concerning treating the sick person, how does the sick person performs his rituals: cleanliness, prayers, fasting, pilgrimage? Also, (5) the visiting of sick person, (6) managing a death episode, (7) the religious conduct when males are managing female disease and vice versa, (8) the emerging controversial ties of vitro fertilization, transplantation, brain death, cloning, genetic engineering. Stu dents should be aware of the (9) Fight of health preservation including cleanliness, sleep, moderation in eating and drinking, the jurisprudence of toxic substances and narcotics, infectious diseases, breast feeding, consanguity marriage, quarantine, death and funerals, dissection of human body for teaching and law, (10) medical behaviour, professional ethics, responsibility of a health professional, (11) issues in protection of acts of a health professional and (12) giving an expert witness at court.

Title	Code	Semester/Duration	Credits
MEDICAL TERMINOLOGY-1 & 2	PT-TERM-125 + 217	1 and 3 / longitudinal	2+2

To study medicine and often health sciences, the student should be familiar with the rules of medical language.this course prepare the students with the clues to formation and understanding words that describe the human body, it's component, conditions and functional process in specific way the course is appropriate for health care administrations as well as health sciences students.

Title	Code	Semester/Duration	Credits
COMPUTER SCIENCE-1&2	ME- COMP-116+124	1and 1/Longitudinal	2+2

Most of the textbooks of medicine and allied sciences are available on CDs, in which a large volume of knowledge is saved and easily retrievable. There are many software packages demonstrating methods and techniques in clinical skills including patient rapport in history taking, clinical examination, investigations and management. Students and teacher can access the internet for the unlimited sources of health information, both at their professional level and public level for health education. Students and future PT professionals a r e educators who have to prepare smart documents and presentations for the health team and profession at large. Knowledge of programmed like Word, Excel, and PowerPoint are indispensable for anyone learner or teacher. Computer is important for students both in the developed or developing world, more so for the latter, who might not have inherited voluminous libraries in their colleges and have to utilize the virtual libraries available all over the world. Medical journal as hard copies are difficult to be owned by one institution, now almost all are available on-line for those who can use the computer efficiently. The course is intensive focusing on the basic principles of computer electronics and applications relevant to health science education. This is

mainly on the hand-on experience in dealing with famous programmed like DOS, Word, Excel, PowerPoint, Access and Internet Explorer. The use of CDs is stressed covered as well as having e-mails and navigating the internet for health information including how to access medical journals, and communicate with scientists worldwide.

Title	Code	Semester/Duration	Credits
PHYSICS FOR MEDICAL EQUIPMENTS AND INVESTIGATIONS (MEDICAL PHYSICS)	ME-PHYS-115	1/Longitudinal	2

The basic principles of general physics are important for understanding certain mechanisms that take part in the human body, and also, the technical background of many medical types of equipment. A medical professional is often confronted with a method of investigation or intervention that is based on physical or mechanical process in the human being and he/she has to deal cautiously with the machine and use it correctly considering its proper maintenance and patient's and worker's safety. These include physical chemistry, gas laws, physics of light and sound, and radiation. The details of the contents include; (1) physical quantities and units, (2) measurements techniques, (3) gases and gas laws, (4) waves, (5) optics, and (6) radiation.

Semester 2

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MEDICINE AND MEDICAL EDUCATION	ME-EDU-114	2/Longitudinal	2

This is a (2 CHs) Longitudinal, starting with a simple medical problem that emphasize the managing and message of health, health care delivery system in the country, the role of the physician in health care, role of other professional and administrative staff, priority health problems, concepts and principles of learning, adult education and learning, student centred and problem-based learning, instructional techniques (lecture, small group etc), student assessment methods, holistic approach, interdisciplinary and partnership concepts, curriculum development, programme evaluation, leadership and professional ethics. Students are divided to groups to spend a week in a health facility, hospital theatre, hospital outpatient, health centre, various directorates and departments of Federal and State Ministries of Health, etc.. Meanwhile students are given discussion sessions on group dynamics and instructional methods, at the end of the course the groups present their field activity using a suitable audiovisual technique. Evaluation assesses the knowledge and attitudes of the students in these three Areas: health system, group dynamics and instructional methods.

Title	Code	Semester/Duration	Credits
BASIC BIOCHEMISTRY	ME-BIOCH-118	2/Longitudinal	2

A Longitudinal course I in Semester 2, to include: atomic structure, chemical bonding, chemical reactions, anabolism and catabolism, molecular formulae, solutions and solubility, morality,

modality, normality and molar fraction, acids and bases, buffers, hydrocarbons, isomerism, introduction organic com pounds, classification of aliphatic and aromatic hydrocarbons, their properties and reactions; Alde hides and ketenes, alcohols, phenols and ethers acids and amines benzenes and their derivatives; carbohydrates, lipids and proteins, vitamins and enzymes and coenzymes, carbohydrates, lipids, pro teens, phospholipids, cholesterol, nucleic acids, nitrogen bases, enzymes and co-enzymes.

Title	Code	Semester/Duration	Credits
GENETICS & MOLECULAR BIOLOGY	ME-GET-119	2 / longitudinal	2

The course describes the flow of information from DNA to MRNA to proteins, as well as the role of molecular genetics in the investigation and understanding of disease processes such as in - born errors of metabolism and cancer as well as utilization of such knowledge in treatment and follow up to protein. The open future of this new aspect ion science will be introduced.

Title	Code	Semester/Duration	Credits
BEHAVIOURAL SCIENCE	ME-BEHAV-129	2 / Block 2 weeks	2

A two-week block during Semester 1, to include: (1) introducing psychology, psychoanalysis, defense mechanism manifesting as behaviours, (2) role of stress in the etiology of physical and psycho logical illness, (3) coping with loss, grief and death, (4) biological basis of behaviour {catecholamine's, dopamine, neurotransmitters, neuropeptides, (5) cultural considerations in medical practice, (6) family structure and dynamics in health care, (6) health and illness behaviour, (7) personality, (8) terminology of psychiatric disease, {9) medical bases of substance and drug abuse.

Title	Code	Semester/Duration	Credits
HUMAN BODY STRUCTURE AND FUNCTION	PT-NAT-126	2 / Block 5 weeks	5

Humans continuously affect their environment and are affected by it. Throughout history, humans have changed their environment through hunting, farming, mining, and introducing new animal species with them as they traveled to new lands. The availability of specific nutrients, in the local environment changes the physiological characteristics of humans, i.e improved nutrition in developed countries has increased the height of Man. The *mileuintereur,* or the internal environment, is formed of the body systems working in harmony to achieve homeostasis, a state of equilibrium of all influences, including the external environment. The body can lead a disease free life, or be crippled by disease, mostly from failure of this equilibrium. Man cannot be separated from his environment. His mental state is closely linked with his surroundings (physical, biological and social) and the extent of his adaptation and tolerance to these surroundings..

Title	Code	Semester/Duration	Credits
PHYSIOTHERAPY SERVICES IN COMMUNITY & HOSPITALS	PT-SERV-127	2 / Block 3 weeks	2

A three-week block during Semester 2. The aim of this course is mainly to introduce electro-hydro-, heat-, light- and mechanotherapy methods and their application for different diseases and injuries, beside paying visits to a number of some PT centres. This will give theoretical and practical knowledge of the various modalities used in physical therapy After the course the student must be able to decide independently in which cases the physical therapy methods are useful and how to use them, with basic practical skill knowledge of such use of suitable equipments. Then after that he has to, (1) list the health facilities provide ing physical medicine services in the Country,(2)list the various modalities used to provide physical treatments (3) describe the equipments available in the PT centres, (4) outline the physical basis, and the ill-nesses which require the physiotherapy intervention, (5) discuss the qualifications of the physiotherapists and (6) prepare assignments on the above topics. These objectives are achieved through visits, questionnaires and discussions.

Title	Code	Semester/Duration	Credits
MUSCULOSKLETAL SYSTEM	PT-SK-128	2 / Block 5 weeks	4

This is a five-week block, on the structural and functional details on bones, muscles, nerves and joints, physiology of excitable tissues, processes of muscle contraction, disruption in continuity of bone and methods or restoration of bone function, complications of bone fractures, calcium me abolish, bone infections, inflammation and degeneration in joints, bone and muscle tumors, living anatomy or bony landmarks of musculoskeletal system, examination skills of musculoskeletal system, musculoskeletal pain, and essential drugs used in musculoskeletal disorders, road traffic accidents and their impact on individual, family and community (outline).

Semester 3

Title	Code	Semester/Duration	Credits
PROFESSIONAL SKILLS-1,2,&3	Pt-SKIL-211, 221, 311	3, 4, &5 / Longitudinal	2+2+2

This course emphasizes oral communication skills to health professionals, including physiotherapists for greater personal and professional confidence, in community physiotherapy service management or owners and managers of such setups. It consists of small study groups presenting real life situate tins and role play. It includes communication skills and physiotherapy laboratory skills. Those are the skills necessary for equipping and running a physical therapy laboratory.

Title	Code	Semester/Duration	Credits
GYMNASTICS	PT-GYM-316	3 / Longitudinal	2

The aim of this course is to provide students with theoretical knowledge and practical skills for teaching and practicing gymnastics, s t u d y i n g the main elements of gymnastics, enhancing special physical preparation level, studying the terminology for describing exercises and developing the skills of anticipating injury and outline the methods of management including suggestions on preventions and changes in the details of the sport itself.

Title	Code	Semester/Duration	Credits
KINESIOLOGY AND BIOMECHANICS	PT-KINS-224	3 / Longitudinal	2

This Longitudinal course provides the student with quantitative and qualitative analysis of human movement in relation to mechanical effects. It includes both anatomical and mechanical issues integrated. The student should: (1) show awareness of the literature in the area of biomechanics, and a prelim nary ability to interpret and evaluate selected research in this area, (2) discuss the morphology and functions of muscles and muscle groups in the human body, (3)describe the biomechanical principles of human motor performance, and (4) enumerate and identify the instruments used in study of bio mechanics.

Title	Code	Semester/Duration	Credits
CARDIOVASCULAR & RESPIRATORY SYSTEMS	PT-CVRS-213	3 / Block 6 weeks	5

This is a six-week block in Semester 3, to include both the respiratory and cardiovascular systems, mainly: {1) describing the anatomy of the thoracic cage, muscles, diaphragm, upper and lower

Respiratory tract {including nasal cavity, larynx, trachea, bronchial tree, lungs, pleura), mediastinum, mechanism of respiration, as well as the anatomy, histology and development of the heart and vessels {2) physiological and biochemical bases of normal lung functions and volumes, gas exchange in lung and tissues, gas transfer, heart functions, cardiac muscle physiology, electrical activity, normal ECG tracing, cardiac cycle, cardiac output, regulation of BP,(3) pathological and microbiological aspects.

Title	Code	Semester/Duration	Credits
NERVOUS SYSTEM AND SPECIAL SENSES	PT-NEURO-218	3 / Block 5 weeks	5

This is a 5-weeks course that covers the basic and clinical sciences of the nervous system including the special senses, all integrated with the necessary skills, around common problems. The content detailed in the comprehensive objectives below includes the anatomy of the central nervous system, peripheral and cranial nerves and plexuses, autonomic nervous system, their histological and devil potential features, their junctions, common problems, methods of examining the systems, diagnosis, management and prevention.

Title	Code	Semester/Duration	Credits
CLINICAL AND SPORT MASSAGE	PT-MASS- 223	3/ Longitudinal	2

The aim of this course is to introduce the theoretical and practical knowledge of different massage elements, their indindicatons contraindications, and the physiological, psychological and emotional effects of professional sympathy. The students study massage in sports, in injury prevention and in clinical setting relieving symptoms in pathological conditions.

Semester 4

Title	Code	Semester/Duration	Credits
BIOCHEMISTRY & PHYSIOLOGY OF EXERCISE	PT- BIOCME-222	4 / Longitudinal	2

The aim of this course is to introduce the alterations which take place n the human body in response of exercise and the benefits or contraindications of exercise. Such aspects include muscle blood flow, systemic circulatory changes and heart disease, temperature regulation and training, a general out line of bioenergetics and the role of AT It may include the biochemical and hematological values and causes of their change.

Title	Code	Semester/Duration	Credits
ERGONOMICS	PT-ERGO-226	4 / Longitudinal	2

This is a Longitudinal course Subject that introduces students to the study of designing objects to better adapted to the shape of the human body and/or to correct human posture, through the use of scientific information. This may be mainly related in seating in work chairs and desks and car seats, but it involves the design of objects, systems and environment for human use, including sports and leisure, and utilizes many disciplines like anatomy, physiology, orthopedics, psychology and design. The final product details and fitness for target user is one of the major objectives of this course.

Title	Code	Semester/Duration	Credits
POUTURE AND POSTURE EDUCATION	PT-POST-228	4 / Longitudinal	2

In this 2CHs Longitudinal course the student will learn about the physique of man who has been created in a best forma, and learn the negative effects of the environments, and his behavior on it, and how to handle this in its correction.

Title	Code	Semester/Duration	Credits
THERAPEUTIC EXERCISES	PT- EXER-225	4 / Longitudinal	2

This Longitudinal course consists of the wide variety of therapeutic exercises to assist patients regaining function after injury or disease. The student should apply systematic implementation

of planned physical movements, posture and activities to: (1) prevent impairment, (2) enhance function, (3) enhance fitness and well-being, The student should acquire the skills necessary to develop exercise programmed that not only address pain and current disability, but protect vulnerable system or region and prevent anticipated sequelae of the injury or disease process.

Title	Code	Semester/Duration	Credits
PHYSICAL EDUCATION PRINCIPLES	PT-PEPR-227	4/ Longitudinal	2

This course is a study of basic theories and therapeutic application of exercise. Emphasis is given to the principles of therapeutic exercise, the appropriate use of related equipment, definition of physical education &physical fitness, risks of sedentary life style,and exercise prescription.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF DISEASE	ME-DIS-212	4 / Block 5 weeks	5

This is a five-week block on general pathology and microbiology to include: {1) general histology, (2) morphology, classification, staining reactions, and pathogen city of bacteria, viruses, fungi, (3) sterilization and disinfection, (4) basic concepts in immunity, (5) principles of inheritance, introduce ton to molecular biology, and genetic defects underlying inherited disorders, (6) general pathology of inflammation, neoplasia and abnormal cell growth, (7) parasites and parasitic diseases, (8) anti microbial and anti-parasitic drugs.

Semester 5

Title	Code	Semester/Duration	Credits
SPORT INJURIES AND THERAPY	PT-SPORT-314	5 / Longitudinal	2

The aim of this course is to handle the basics of recreational and professional sports and its applications and training methods in different sport events. It surveys the organization of both types of sports considering gender and age aspects, including the biological basis of recreation, programmed for weight regulation, types of injuries resulting from all and the suitable stationary and ambulatory therapy services. It included also the specialty-related knowledge in sports medicine at large. It may also include safety precautions and organization of recreation in training camps.

Title	Code	Semester/Duration	Credits
ELECTROTHERY & PT EQUIPMENT	PT-EQUIP-315	5/ Longitudinal	4

The aim of this course is to expand on the various modalities presenting equipments used the terminology and manufacturers of major units and the cost effective methods used for equipping stationary and ambulatory private service clinics in hospitals, recreational sport facilities, professional sport halls, hospitals, primary health care units and homes.

Title	Code	Semester/Duration	Credits
REHABILITATION	PT-REHAB- 317	5/ Longitudinal	2

This is Longitudinal course that cares for methods of restoration of body function through physical therapy. It includes: (1) considering function during treatment, (2) constructing after care schedule of checks, (3) teaching of appropriate behaviour that restores shape and action, (4) utilization of community physiotherapy service.

Title	Code	Semester/Duration	Credits
ORTHOPEDIC PHYSIOTERAPY	PT-ORTHO-326	5 / Longitudinal	2

The aim of this course is to review the theoretical basic scientific knowledge and provide practical skills on musculoskeletal physiotherapy During the course students see a large number of cases and attend clinical assessments of patients needing physical therapy, see and discuss the choice of a physical modality and monitor the effect of management on the patient The student will have a log book to assure completion of certain tasks, fulfillment of specific objectives on practical skills.

Title	Code	Semester/Duration	Credits
COMMUNITY MEDICINE & PUBLIC HEALTH	PT-COM-312	5 / Block 2 weeks	2

This two-week-clerkship provides students with elements of community physiotherapy service. The student should: (1) enumerate the types of domiciliary services for adults with physical health difficulties, (2) coordinates with fellow students, physiotherapists and other professionals (particularly the general practitioner) offering home or hospital care for the patient, {3) assist in treatment required for physical difficulties, mobility, pain and chest problems, (4)enumerate conditions that may be managed as outpatients, {5) show understanding, and ability to execute, mobilization techniques and operate relevant apparatuses, (6) show understanding of specific exercise therapy and electrotherapy, and use them

Semester 6

Title	Code	Semester/Duration	Credits
NEUROLOGICAL PHYSIOTHERAPY	PT-NEURO- 322	6 / Longitudinal	4

The aim of this clerkship is to give a survey of possibilities for treatment and rehabilitation of patients with neurological diseases, and survey the possibilities of applying physiotherapy methods in cases of peripheral and central nervous diseases. The student spends most of the time in neurological and neurosurgical wards, classifying problems that require management and aftercare policy. These include: headache, monoplegia, hemiplegic, quadriplegia, peripheral nerve injury, spondylitis, backache, parkinsonism, ataxias, etc.

Title	Code	Semester/Duration	Credits
PEDIATRIC PHYSIOTHERAPY	PT-PED- 323	6/ Longitudinal	2

The aim of this course is to strengthen theoretical background and offer practical skills on physiotherapeutic management of sensory and motor deficits, developmental disorders and functional limitations occurring with diseases in infancy and childhood. These conditions include cerebral palsy, neuromuscular diseases, juvenile chronic arthritis, bronchial asthma. It requires also giving first aid in critical situations of seizures, fever and acute attack of bronchial asthma and bronchiectasis.

Title	Code	Semester/Duration	Credits
PHYSIOTHERAPY FOR INTENSIVE CARE PATIENTS	PT-ICU- 324	6/ Longitudinal	2

This is a long-clerkship caring for patients in the ICU for any reason. Such patients remain for some time, usually with limited movements and activities, and connected to a system of tubes and equipments. The student should: {1) enumerate the conditions in the ICU, {2) the consequences of being in an ICU for a long time in each of these conditions, (3) the physical management that suits each case and helps in healing of the original ailment and future restoration of unction, (4) the team work and coordination with other health professional working on the patient in the ICU, and (5) the specific methods in physiotherapy used in each case where tube and equipments are connected to the patient.

Title	Code	Semester/Duration	Credits
PHYSIOTHERAPY IN CARDIORESPIRATORY CLINIC	PT-CVRS -325	6/ Longitudinal	2

The aim of this course is to introduce theoretical and practical knowledge on internal diseases in the chest that require physiotherapeutic intervention, and that respond to such treatment or to any other means of rehabilitation in cardio respiratory diseases and the CCU problems, chest problems particularly bronchiectasis, pneumonia, bronchial drainage, respiration training, chest pain, and post-traumatic pain.

Title	Code	Semester/Duration	Credits
GERIATRIC CARE	PT-GER- 321	6 / Longitudinal	2

The aim of this course is to introduce specific skills in geriatric medicine related to physical therapy, and to handle the relations between physical activity and age, including the dynamics of changes in human organism with age and age-related characteristics features and capabilities, and the adaptations a physiotherapist has to make in his/her understanding of problems and the methods and techniques used in management and rehabilitation.

Title	Code	Semester/Duration	Credits
BASIC PHARMACOLOGY	PT-PHARMA-318	6 / Longitudinal	2

In this 2CHS longitudinal course the students will learn some of the most important basic pharmacological facts needed for studying and understanding the nature and the resourced of the commonly used drugs pharma and their Preparation and their dosage forms, which are used to treat the common diseases

It introduces the student to the basic facts related to nature of drug the interaction between lining organization and drugs mode of effect, dosage action, interactions, direct effects, side effects and precautions to avoid the hazards of their work with them.

Semester 7

Title	Code	Semester/Duration	Credits
HYDROTHERAPY AND SPA TRAINING	PT-HYDRO-415	7 / Longitudinal	2

The use of water for treatment has been known for more than five thousand years in the old Egyptians, Greece and roman civilization.

As an alternative system of healing, hydrotherapy is the oldest, safest and cheapest method of treatment. It is easy to use in all forms as vapor, liquid or solid.

It markedly relieves pain, reduces swelling, inflammation and treats a variety of ailments.

Title	Code	Semester/Duration	Credits
RESEARCH METHODOLOGY	PT-RESE-418	7/ block 2 Weeks	2

This is a two-week- block, which focuses on the synthesis of professional knowledge, skills, and attitudes in preparation for professional employment and lifelong learning. Students are trained to perform small research projects in one of the physiotherapy topics that enable them to collect data, review literature, obtain results and discuss their findings in the form of presentations. The student should: (1) describe research methodology listing elements of research, {2) collect up to date information on a particular topic, using proper sampling techniques (3) execute a small research project and analyze obtained data, (4) discuss the significance of the results obtained and research conclusions, and (5) write down a research paper, and (6) present his findings in front of the class and discusses it with his colleagues and staff.

Title	Code	Semester/Duration	Credits
OPHTHALMOLOGY AND PT TRAINIG	PT-OPTAL-413	7 / block 2 weeks	2

In this course the student should learn the movement of the eye ball (muscles and nerves) and physiology of extra ocular muscles.

Title	Code	Semester/Duration	Credits
HEALTH ECONOMICS AND HOSPITAL MANAGEMENT	PT-HM-411	7/ block 2 weeks	2

This two-week-clerkship addresses the increasing role of health economics in intoning decision making in health systems worldwide. The student should: (1) define health economics, (2) describe the econometric methods of research, (3) discuss microeconomics for decision-making and policy analysis in health, (4) describe clinical decision analysis, (5) basics of administering a physiotherapy unit.

Title	Code	Semester/Duration	Credits
PROSTHEICS AND ORTHOYICS	PT-ORTH-417	7 / block 4 weeks	4

The political instability in a number of African countries led to local disputes and wars. Sudan is one of these countries suffering war for more than 50ys. During these wars millions of mines had been buried mainly in the lands where civilians move and many of them became victims to those mines and lost their limbs, mainly the lower extremities.

In addition to this Sudan is a mycetoma - Madura region, which affect many people (peasants & farmers) ending up with amputation of the affected limb.On the other hand, complications of certain diseases such as diabetes mellitus, osteomyelitis, arterial insufficiency in the lower limbs, and the much rising the road traffic accidents, may all lead to the loss of the lower limbs. All these patients ending with amputated limbs will require substitute with artificial ones. And this in turn, requires comprehensive physiotherapy rehabilitation.

Title	Code	Semester/Duration	Credits
PHYSIOTHERAPY AND IMAGING	PT-RAD-416	7 / block 2 weeks	2

The practice of physiotherapy requires a good experience in reading radiological images and using the findings to plan management and follow up for the patients. This course explores the basic principles of radiological imaging.

Title	Code	Semester/Duration	Credits
ENT PHYSIOTHERAPY	PT-ENT-414	7 / block 2 weeks	2

The treatment of hearing impairments, deafness and the dump, mainly in child- hood, has witnessed great advances with the development of ENT surgical technologies, and cochlear implantation. This surgery has to be followed by a precise speech therapy programme guided by a well-trained speech therapist or a physiotherapy technologist.

Also, there is a number of ENT problems associated with defects in speech and articulation problems caused by neurological diseases that needs treatment intervention by the physiotherapy technologist.

Title	Code	Semester/Duration	Credits
GENERAL PT LAB AND ELECTROTHERAPY	PT-LAB-412	7 / block 4 weeks	4

In this course, the students will work supervised in a physiotherapy department to learn the practical methods for managing the department and provide physiotherapeutic services to patients.

Semester 8

Title	Code	Semester/Duration	Credits
CASE WORK UP AND PRESENTATION	PT-CASE-423	8 / block 5 weeks	4

This course is a review for genuine cases which commonly present to physiotherapy clinics.

Title	Code	Semester/Duration	Credits
TRAINING IN PT LAB AND PRESENTATION	PT-ET-422	8 / block 4 weeks	4

This course is an approach to electrotherapy from a practical perspective. It takes the basic information about electrotherapy and applies it to practical scenarios encountered by physiotherapists on a daily basis.

Title	Code	Semester/Duration	Credits
PRIMARY HEALTH CARE	PT-PHC- 421	8/ Block 4 weeks	2

This four-week clerkship, two hours per week during Semester 7, that introduces the student to the front line of medical care where the patient presents for the first time. The student should: (1) show understanding of the healthcare system, {2) describe the range of primary health care services, {3) enumerate the conditions requiring physical therapy at the level of the health centre, (4) list the faculties for physical therapy that should be available at the PHC.

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT	PT-GRAD-424	8 / Longitudinal	4

A topic relevant to physiotherapy practice, selected through student-supervisor consultation, and submitted within 4-6 weeks.

NOTE:

THE DIPLOMA PROGRAMME IS Similar TO THE BACHELOR 'S EXCEPT THAT THE THEORETI CAL PHASE 2 COURSES ARE REDUCES TO ONE SEMESTER, AND THE REST OF THE PERIOD IS THE CLERKSHIP WHICH INCLUDES MORE PRACTICAL SKILL TRAINING {SEE DETAILED OBJECTIVES OF THE COURSES].

FACULTY OF

ADMINISTRATIVE SCIENCES

UNDERGRADUATE
& GRADUATE
PROSPECTUS

VISION AND MISSION

The VIAION of the AS is to provide an excellent university education consistent with The National University Mission Statement. It prepares graduates to perform successfully in the business environment by creating a cooperative learning environment among students, faculty, and other stakeholders. In support of this mission, The college encourages faculty research and service, particularly efforts to enhance the teaching-learning process in business environment. The MISSION emphasizes fundamental skills that will enable our graduates to adapt to a dynamic society; Create a curriculum that stresses teamwork, initiative, experiential learning, student involvement, and real-world applications; Building an environment that fosters close faculty-student relationships; and Encouraging a commitment to high social and ethical code of conduct.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Administrative Sciences, has to:

1 - Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology or computer sciences, engineering sciences, family sciences, agricultural and animal production or arts or design. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certifi cate scores.

3 - Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Administrative Sciences.

4 - Pay the published fees: 18,000 SDG or US $ 3,000 [international students] (2018).

CAREER ADVICE

Business Administration and Human Resources track include human resources management, organizational behaviour, organization design, communication at work, and perspective of international labor, strategic management, organizational psychology and graduation research. Accounting and Finance specialization includes foundations of financial accounting, intermediate accounting, advanced accounting, cost accounting, accounting information systems, capital budget, taxes, theory and practice in audit, and graduation research project. Marketing track includes analysis of consumer behaviour, supply chain management, marketing research/survey, sales and sales management, marketing management, international and e-marketing, communication in integrated marketing and graduation research. Management Information Systems' (MIS) track includes work information systems, and the concepts of information databases at work, and management of information sources, communication technology, software engineering, management information technology, practical procedures in utilization of management information, and graduation research.

Graduates of these disciplines, serve in all areas related to business, management, employment, and in all ministries, international and non-governmental organizations, banks, factories, and private sector companies - particularly self-employment in business. They may proceed to study for MSc or PhD degrees or obtain fellowship in their domain. The graduate may be interested in managerial, commercial, industrial or charity career, related to one of the various specialties in the discipline.

FACULTY OBJECTIVES

The objectives of the Faculty of Administrative Sciences are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these valu es, as an important component of the university's philosophy and message.

2. Graduate AS professionals at the entry levels with strong community orientation and ethical components, and self-directed learning capabilities.

3. Contribute to community development through the establishment of a knowledge society that transforms education to sustainable developmental projects, on all aspects of administrative sciences, through the following: (a) partnership in designing developmental programmes and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) contribution in continuous education through short and long term courses, to improve efficiency of politicians and diplomats, and (c) provision of essential data and documents to improve quality of performance of all concerned, through partnership with the relevant ministries and organizations.

4. Strengthen research in AS and related professions, making use of the university's links and available resources.

CURRICULUM OBJECTIVES

Characteristics of the graduate with Bachelor of administrative Sciences

A graduate of the faculty of Administrative sciences should be able to

1. Adopt the strategies of the University and abide by its objectives and rules stated in its constitution.
2. Observe in his/her practice, the ethical codes of the profession, which agree with the Sudanese values, beliefs and norms, and maintain good and honest peaceful relations with every possible person or entity.
3. Appreciate the value of diversity and multi-ethnicity in solving management problems with emphatic, humane and fair practice.
4. Detect and manage problems of management including business administration, accountancy, marketing and information systems, at their level and pay attention to those which affect the individuals and groups in the country.
5. Integrate basic and applied knowledge and common sense in solving the administrative sciences problems between individuals, communities and countries.
6. Use scientific knowledge in the interpretation and management of problems, according to known methods of logical thinking and problem solving.
7. Accepts to work in all settings according to needs, and act to improve the service delivery systems both quantitatively and qualitatively.
8. Encourage community participation and act in recruiting various sectors in defining problems of developmental, administrative origin and planning, and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices.
9. Adhere to “team approach”, acting as an efficient member, and ensuring both effectiveness and homogeneity among the members.
10. Manage and administrative unit, business or chapter efficiently according to scientific, social, statistical, economic and legal bases.
11. Continue to consider elements of efficiency, costing and economic implications in his/her diagnostic and interventional choices, particularly the financial abilities of his/her clients
12. Acquire the skills of teaching, learning and communication efficiently to carry out his/her duties in educating others and in winning the confidence of the learners and trainees and their societies.
13. Acquire the skills of self education (self-directed learning), and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/her colleagues in the professional team.

14. Carry out AS research, alone or with a professional team, using scientific methods known in such activities, involving multidisciplinary groups, and utilizing the experience of national and international financial or managerial organizations and NGOs.
15. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career, and skills of computer-assisted presentations.
16. Acquire postgraduate qualification in the discipline of his/her choice, recognizing the needs of the society for certain specialties, particularly alleviation of poverty, sustainable development, conflict resolution, governance, justice, democracy and equity.

Feedback to students after mid-course and end of course assessment is an essential part of the administraive programme

ECUCATIONAL STRATEGIES AND METHODS

The learning strategies emphasize the following: (1) early acquisition of basic skills, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problem-oriented learning, (4) community-oriented and community-based activities, (5) integration of basic and applied knowledge in a multidisciplinary approach, (6) self- and peer education and evaluation, (7) team-work approach, (8) a wide range of electives, (9) continuous evaluation and (10) continuous education.

The Faculty adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions - once/ week at least (3) field practice in developmental and political issues in settings and societies not less than 1/5th of the timetable, (4 educational assignments, reports and research activities (as many as the programme would allow- at least one per module), (8) electives -not more than 10% of the curriculum timetable, and (9) graduation project.

TIMETABLE

Students must complete 145 credit hours to graduate with a B Sc. Each required course must be completed with a minimum grade of C. Students must attain a minimum of a cumulative grade point average (CGPA) of at least 2.0

The B. AS. programme requires four years (8 semesters) divided into groups of modules:

1. Faculty requirements: requirements shared with other specializations in Faculty, e.g calculus, statistics, economics, accounting principles, management principles and fundamentals of computer.
2. Specialization requirements: requirements specific for specialization, e.g. financial management, marketing research, fundamentals of finance, accounting and business information systems.

Semester 1 [17 CHs- 16 weeks]

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Islamic studies-1	ISLAM-111	Longit.	2	--	-	2
2	Arabic or alternative -language-1	ARAB-112	,,	2	-	-	2
3	English language-1	ENG-113	,,	2	-	-	2
4	Sudanese studies-1	SUDN-110	,,	2	-	-	2
5	Sudanese studies-2	SUDN-120	,,	3	-	-	3
6	Islamic studies-2	ISLAM-121	,,	2	-	-	3
7	Arabic or alternative -language-2	ARAB-122	,,	3	-	-	3
8	English language-2	ENG-123	,,	3	-	-	3
9	Fundamentals of computer	INFO-118	,,	3	-	-	3
			18	23	-	-	23

Semester 2 [22 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Calculus	CALC-114	Longit.	3	--	-	3
2	Management Principles-1	MGMT-115	,,	3	-	-	3
3	Economics Principles	ECON-116	,,	3	-	-	3
4	Accounting Principles	SUDN-120	,,	3	-	-	3
5	Marketing principles and applications	MRKT-215	,,	3	-	-	3
6	Communication skills	BUSN-128	,,	3	-	-	3
7	Accounting principles 2	ACC-129	,,	3	-	-	3
			18	21	-	-	21

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

SUMMAR 1 AND ELECTIVES.

1. Write 1500 words on a current international economic crisis, or “language of administration” “internet sources of management studies” (ID-SUM-131) 2 CHs,
2. Repeat courses or examinations for late comers and failures.

Semester 3 [22 CHs- 23 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Microeconomics	ECON-124	Longit	3	-	-	3
2	Intermediate accounting1	Acct-218	,,	3	-	-	3
3	Business law	BUSN-216	,,	3	-	-	3
4	Spread sheet applications	Info - 224	,,.	3	--	-	3
5	Managerial economics	ECON-214	,,	3	-	-	3
6	Business Statistics	BUS - 215	,,	3	-	-	3
7	Management principles and applications	MGMT-126	,,	3	-	-	3
			18	24	-	-	24

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 4 [17 CHs- 19 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Cost accounting	ACCN-412	Longit.	3	--	-	3
2	Intermediate accounting 2	ACCT-222	,,	3	-	-	3
3	Quantitative methods	STAT-223	,,	3	-	-	3
4	Data management applications	INFO-225	,,	3	-	-	3
5	Organization behaviour	BUSN-227	,,	2	-	-	2
6	Fundamentals of financial management	BFIN-228	,,	3	-	-	3
	Macroeconomics	ECON-217	,,	3			3
			18	20			20

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

SUMMAR 2 AND ELEVTIVE MODULES

1. Research methodology and writing in management (MS-SUM231) 2 CHs
2. Elective (E232): Visit an institution and write 1500 words on its management system 2 CH
3. Repeat courses or examinations for late comers and failures.

B Sc BUSINESS ADMINIStRATION

The business administration specialization prepares the student for careers in managing organizational resources in profit and non-profit organizations. The programme is designed to provide solid background in people skills, communications skills and organization skills.

Semester 5 [22 CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Fundamentals of computer information systems	INFO-312	Longit.	2	-	2	3
2	Money and banking	ECON-311	Longit	2	2	-	3
3	Business ethics and social responsibility	BUSN-314	Longit	2	2	-	3
4	Fundamentals of managerial accounting	ACCT-315	Longit	2	2	-	3
5	Statistical inference	STAT-316	Longit	2	2	-	3
6	Financial management	MGMT-317	Longit	2	2	-	3
7	International economics	ECON-321	Longit	2	2	-	3
		Total		14	12	2	21

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 6 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	International management	MGMT-322	Longit.	2	2	-	3
2	Production & Operation management	MGMT-324	Longit.	2	2	-	3
3	Project management	MGMT-325	Longit.	2	2	-	3
4	Total quality management	MGMT-326	Longit.	2	2	-	3
5	Human resource management	MHRM-327	Longit.	2	2	-	3
		Total		10	10	-	15

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

.SUMMAR 3 AND ELECTIVES

1. Training in a company or bank (MS-SUM-331)2 CHs Block 2 weeks
2. Elective (E332): A 1000 work essay on a current managerial crises 1CH
3. Repeat courses or examinations for late comers and failures.

Semester 7 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Advanced organizational behaviour	MGMT-421	Longit.	2	2	-	3
2	Organizational design	MGMT-412	Longit.	2	2	-	3
3	Communication for business	MGMT-413	Longit.	2	2	-	3
4	Perspectives on international business	MGMT-414	Longit.	2	2	-	3
5	Effective business communication	BUSN-416	Longit.	2	2	-	3
		Total		10	10	-	15

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 8 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Business policy and strategy	BUSN-421	Longit.	2	2	-	3
2	Strategic management	MGMT-422	Longit.	2	2	-	3
3	Organizational psychology	PSYC-423	Longit.	2	2	-	3
4	Small business management	MGMT-417	Longit.	2	2	-	3
5	Applied project	MGMT-426	Longit.	3	3	-	6
		Total		11	11	-	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

B. Sc. MARKETING

Marketing relates business strategy decisions to the environment in which companies operate. Strategy decisions consider product introduction; extensions of product line and deletions; distribution channels for products; market-oriented pricing; and promotion including personal selling and advertising. Besides major social and economic influence on strategy, the nature of market demand and competitive activity are carefully examined in terms of their influence on strategy choice.

Semester 5 [22 CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Fundamentals of computer information systems	INFO-311	Longit.	2	2	-	3
2	Money and banking	ECON-311	Longit.	2	2	-	3
3	Business ethics and social responsibility	BUSN-314	Longit.	2	2	-	3
4	Fundamentals of managerial accounting	ACCT-312	Longit.	2	2	-	3
5	Financial management	MGMT-317	Longit.	2	2	-	3
6	International economics	ECON-321	Longit.	2	2	-	3
		Total		12	12	-	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 6 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	International management	MGMT-322	Longit.	2	2	-	3
2	Production & Operations management	MGMT-324	Longit.	2	2	-	3
3	Project management	MGMT-325	Longit.	2	2	-	3
4	Total Quality Management	MGMT-326	Longit.	2	2	-	3
5	Human Resources Management	MHRM-327	Longit.	2	2	-	3
5	Quantitative business analysis	STAT-316	Longit.	2	2	-	3
		Total		12	12	-	18

Examination of longitudinal courses (+re-sits) 2 week

SUMMAR 3 AND ELECTIVES

1. Training in a company or bank (MS-SUM-331)2 CHs Block 2 weeks
2. Elective (E332): A 1000 work essay on a current managerial crises 1CH
3. Repeat courses or examinations for late comers and failures.

Semester 7 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Analysis of consumer behavior	MKTG-421	Longit.	2	2	-	3
2	Supply chain management	MKTG-412	Longit.	2	2	-	3
3	Marketing research	MKTG-413	Longit.	2	2	-	3
4	Sales and sales management	MKTG-414	Longit.	2	2	-	3
5	Marketing management	MKTG-415	Longit.	2	2	-	3
6	Financial institutions	MKTG-416	Longit.	2	2	-	3
7	Advanced Organization Behavior	MGMT-414	Longit.	2	2	-	3
		Total		14	-	-	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 8 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Business policy and strategy	BUSN-421	Longit.	2	2	-	3
2	International marketing	MKTG-422	Longit.	2	2	-	3
3	E-marketing	MKTG-423	Longit.	2	2	2	3
4	Advertising	MKTG-424	Longit.	2	-	-	3
5	Strategic management	MGMT-422	Longit.	2	2	-	3
6	Graduation project	MKTG-425	Longit.	3	3	-	6
		Total		12	-	6	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

B. Sc. ACCOUNTING

Accounting is the process of identifying, measuring and communicating economic information about an organization for the purpose of making decisions and informed judgments. Accounting courses integrate the study of the theory and current practice of accounting with research and computer applications. Students will be able to use business and accounting concepts to make decisions about difficult issues. They will be trained as problem solvers who critically evaluate alternatives and examine which approach will be best for a business when more than

one approach can be logically supported. Users of accounting information include the management of the entity or organization, the owners of the organization, employees, and various other agencies that are concerned with regulatory and tax matters.

Semester 5 [221CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Fundamentals of financial accounting-1	ACCT-311	Longit.	2	2	-	3
2	Fundamentals of Managerial accounting-	ACCT-312	Longit.	2	2	-	3
3	Business Ethics &Social Responsibility	BUSN-314	Longit.	2	2	-	3
4	International economics	ECON-321	Longit.	2	2	-	3
5	Money and banking system	ECON-311	Longit.	2	2	-	3
6	Statistical inference	STAT-316	Longit.	2	2	-	3
7	Financial management2	MGMT-317	Longit.	2	2	-	3
		Total		14	14	-	21

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 6 [21 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Auditing theory and practice	ACCT-313	Longit.	2	2	-	3
2	International management	MGMT-322	Longit.	2	2	-	3
3	Fundamentals of financial accounting-2	ACCT-311	Longit.	2	2	-	3
4	Production & Operations management	MGMT-324	Longit.	2	2	-	3
5	Project management	MGMT-325	Longit.	2	2	-	3
6	Quantitative business analysis	STAT-316	Longit.	2	2	-	3
7	E-Auditing	ACCT-317	Longit.	2	-	2	3
		Total		14	12	2	21

Examination of longitudinal courses (+re-sits) 2week

SUMMAR 3 AND ELECTIVES

1. Training in a company or bank (MS-SUM-331)2 CHs Block 2 weeks
2. Elective (E332): A 1000 work essay on a current managerial crises 1CH
3. Repeat courses or examinations for late comers and failures.

Semester 7 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	International accounting	ACCT-412	Longit.	2	2	-	3
2	Accounting Information Systems	MGMT-413	Longit.	2	-	2	3
3	Advanced organizational behavior	MGMT-414	Longit.	2	2	-	3
4	Introduction to investments & financial analysis	BFIN-416	Longit.	2	2	-	3
5	Commercial banking	BFIN-417	Longit.	2	2	-	3
		Total		10	8	2	15

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 8 [24 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Capital budgeting	ACCT-421	Longit.	2	2	-	3
2	Taxation	BFIN-422	Longit.	2	2	-	3
3	Advanced accounting	MGMT-423	Longit.	2	2	-	3
4	Government accounting	ACCT-427	Longit.	2	2	-	3
5	Graduation project	BFIN-428	Longit.	3	2	-	6
		Total		11	10	-	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

B. Sc. MANAGEMENT INFORMATION SYStEMS

Information is an organizational resource shared among various functional areas. The specialization in Management of Information Systems prepares students to manage such information, to act as liaison between functional areas of business and information technology, and to design, develop, and maintain information management systems. Students completing this programme enter positions as systems analysts, project managers, network administrators, database specialists, and Web page developers.

Semester 5 [20 CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Fundamentals of computer information systems	INFO-311	Longit.	2	-	2	3
2	International economics	ECON-321	Longit.	2	2	-	3
3	Money and banking	ECON-313	Longit.	2	2	-	3
4	Business Ethics & social responsibility	BUSN-314	Longit.	2	2	-	3
5	Fundamentals of managerial accounting	ACCT-32	Longit.	2	2	-	3
6	Statistical inference	STAT-316	Longit.	2	2	-	3
7	Financial management	MGMT-317	Longit.	2	2	-	3
		Total		14	12	2	21

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester 6 [21 CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Information systems	INFO-321	Longit.	2	2	-	3
3	International management	MGMT-322	Longit.	2	2	-	3
4	Business statistics	STAT-324	Longit.	2	2	-	3
5	Production & operation management	MGMT-324	Longit.	2	2	-	3
6	Project management	MGMT-325	Longit.	2	2	-	3
7	Computer programming	INFO-326	Longit.	2	-	2	3
		Total		12	10	-	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

SUMMAR 3 AND ELECTIVES

1. Training in a company or bank (MS-SUM-331)2 CHs Block 2 weeks
2. Elective (E332): A 1000 work essay on a current managerial crises 1CH
3. Repeat courses or examinations for late comers and failures.

Semester 7 [18 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Quantitative business analysis	BUSN-421	Longit.	2	--	2	3
2	Business information system	INFO-412	Longit.	2	-	2	3
3	Database concept for business	INFO-413	Longit.	2	-	2	3
4	Information resource management	INFO-414	Longit.	2	-	2	3
5	Operating systems	INFO-415	Longit.	2	-	2	3
6	Communication technology-1	INFO-416	Longit.	2	-	2	3
		Total		12	-	12	18

Examination of longitudinal courses (+re-sits) 2 week

Semester 8 [21 CHs- 22 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Software engineering	INFO-421	Longit.	2	-	2	3
2	Managing information technology	INFO-422	Longit.	2	-	2	3
3	Programming for business applications	INFO-423	Longit.	2	-	2	3
4	Communication technology-2	INFO-424	Longit.	2	-	2	3
5	Web page development	INFO-425	Longit.	2	-	2	3
6	Information management practicum- project	BFIN-426	Longit.	2	-	2	3
		Total		12	-	2	18

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

COURSE OUTLINE

Detailed behavioural objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included here

SEMESTER 1

Title	Code	Semester/Duration	Credits
ISLAMIC STUDIES	ISLAM-111+121	1and 2/Longitudinal	2+2

This is a National requirement compulsory to all Muslim students. It is composed of two courses 101 in Semester 1 and 111 in Semester 2. Their contents are: (1) the recitation of two Suras of the Holy Quran, that introduce a lot of behavioural and ethical issues for Muslims as well as for mankind, (2) the basic sources of religious thought and religious groups, (3) Islamic thought as regards managing organizations, and dealings and relationships between businesses and individuals, (4) Zakat and Islamic economic laws, (5) Islamic ethics and values and how they affect dealing with non-Muslims in a globalized world.

Title	Code	Semester/Duration	Credits
ARABIC	ARAB-112+122	1and 2/Longitudinal	2+2

This is a National requirement compulsory to all Arabic speaking students. It is composed of two courses 101 in Semester 1 and 111 in Semester 2. It includes (1) the basics of Arabic language grammar that would allow students to read and write correctly, (2) pronunciation and punctuation of an Arabic text, (3) summarizing and abridging a lengthy Arabic text, (4) abstracts of Arabic poetry, (5) principles of translation of text between Arabic and English languages.

Title	Code	Semester/Duration	Credits
ENGLISH LANGUAGE	SS-ENG-113+123, 213	1, 2,3/Longitudinal	2+2+2

English is the language of business internationally. The course is composed of two courses 102 in Semester 1 and 112 in Semester 2. It aims at providing the students with: (1) knowledge of management, economical, and financial terms and idioms in the English language, (2) the ability to read and comprehend texts and reference books in English, (3) the ability to communicate with the outside world of business especially with the advent of globalization, (4) the ability to express her/himself fluently and in proper English in their daily and work activities, (5) the ability to translate text between English and Arabic easily, (6) the ability to navigate and obtain information from the internet.

Title	Code	Semester/Duration	Credits
CALCULUS	BUSN-114	1/Longitudinal	3

This course is intended for majors in business. Topics include differential calculus, integral calculus, functions and limits, derivatives of algebraic functions and some linear algebra, with applications to areas of business and social science.

Title	Code	Semester/Duration	Credits
MANAGEMENT PRINCIPLES	MNGT-115	1/Longitudinal	2

Students learn efficient and effective use of resources in achieving organizational goals. Topics include the environment of management, the functions of planning, organizing, leading, and controlling, and decisionmaking for organizational leaders.

Title	Code	Semester/Duration	Credits
ECONOMIC PRINCIPLES	ECON-116	1/Longitudinal	3

The course studies the market as a whole and how an economy functions focusing on aggregate relationships. It develops measures and theories of economic performance to study such issues as unemployment, inflation, and business cycles. Areas of study include aggregate supply and demand, fiscal policy, money and banking, monetary policy, economic growth, impacts of government budget and deficit financing, and consequences of international trade and finance, and the level of national production. Examines government policies designed to correct for unemployment and inflation with close attention to the use of fiscal and monetary policies.

Title	Code	Semester/Duration	Credits
ACCOUNTING PRINCIPLES-1	ACCT-311	1/Longitudinal	3

This is an introduction to financial accounting for accounting majors. It includes the study and analysis of the information system resulting in financial statements and corporate annual reports. It emphasizes understanding accounting concepts as well as their applications.

Title	Code	Semester/Duration	Credits
FUNDAMENTALS OF COMPUTER	INFO-118	1/Longitudinal	3

This course investigates the role and impact of computer applications on computer information systems in general and specifically as applied to business requirements. Surveys the components of a computer information system; explores computer information systems in areas such as manufacturing, medicine, education, and government; discusses the issues of computerizing information resources. It directs attention to computer information systems in business and identifies the need for and function of formal systems development methodologies.

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES1	SUDN-110	1/Longitudinal	

This a longitudinal course in Semester 1, at the end of which, the student is expected to be able to: (1) Describe the geographical nature of Sudan, (2) Classify the population and explain the distribution of them in country, (3)m Discuss and compare between historical and culture evaluation, (4) Locate of the features Sudanese economy, and (5) List the educational policies and the administrative regulations, which passed on the Sudan.

Semester 2

Title	Code	Semester/Duration	Credits
MICROECONOMICS	ECON-124	2/Longitudinal	3

This course studies the behaviour and interaction of fundamental decision-making units in an economy, especially consumers and business firms. It applies such economic principles as scarcity, supply and demand, and elasticity to a variety of social issues. Topics include individual decision-making, pricing, supply and demand functions of firms, market structures, impacts of the government sector, and impacts of distribution of income alternatives. It also discusses the resource allocation problems of households and business firms, economic theories of social problems, and the economic implications of government policies affecting the environment, the workplace, and industrial organization.

Title	Code	Semester/Duration	Credits
COMMUNICATION SKILLS	BUSN-128	2/Longitudinal	3

Effective Business Communication will offer a survey of business communications and documents used in the typical organization: emails, letters, memos, and business reports. The course will offer advanced English grammar, usage, and mechanics with a focus on sentence-level accuracy. The course will emphasize the delivery of concise, correct, clear, accurate, and courteous written and spoken messages. Application of writing and speaking to the communication requirements of business: their roles, techniques, and types, with exercises in the formulation of some business communication products.

Title	Code	Semester/Duration	Credits
MANAGEMENT PRINCIPLES & APPLICATIONS	MNGT-126	2/Longitudinal	2

This course emphasizes the application of management principles and techniques in business settings. The course reviews management principles, including organizational designs and the use of groups, leadership, communication, planning, decision-making and controlling tests the students managerial competency and skills in those areas. Other topics include: professional ethics, supervision of staff, productivity standards, interpersonal skill development, organizational assessment and benchmarking, work redesign, and strategic planning.

Title	Code	Semester/Duration	Credits
ACCOUNTING PRINCIPLES-2	ACCT-213	2/Longitudinal	3

Introduction to the basic accounting cycle, accounting transaction analysis, preparation of journal entries, trial balance, worksheets, and financial statements; financial statements, and analysis of accounts receivable, notes payable, notes receivable, merchandise inventory, property, plant, equipment, and long-term bonds. Accounting for sole proprietorships is emphasized, including special journal accounting procedures. Accounting for partnerships and corporations is introduced.

Title	Code	Semester/Duration	Credits
COMMUNICATION SKILLS	BUSN-128	2/Longitudinal	3

Effective Business Communication will offer a survey of business communications and documents used in the typical organization: emails, letters, memos, and business reports. The course will offer advanced English grammar, usage, and mechanics with a focus on sentence-level accuracy. The course will emphasize the delivery of concise, correct, clear, accurate, and courteous written and spoken messages. Application of writing and speaking to the communication requirements of business: their roles, techniques, and types, with exercises in the formulation of some business communication products.

Title	Code	Semester/Duration	Credits
SUDANESE STUDIES2	SUDN-130	2/Longitudinal	2

This a longitudinal course in Semester 2, at the end of whcich the student should be able to: (1) discuss and compare the different Sudan's political system, which passed out of the country, (2) deepen the Sudanese's identity and culture, (3) strengthen the spirit group and harmony, security and stability through a coherent social fabric, and (4) achieve national unity in the framework of pluralism and geographic and cultural diversity.

Semester 3

Title	Code	Semester/Duration	Credits
SPREADSHEET APPLICATIONS	INFO-224	3/Longitudinal	3

This is cours serves needs of business people learning spread sheet accounting. It includes the use of electronic spreadsheets for a variety of accounting applications, including general ledger, payroll, taxation, budgeting, and forecasting. Spreadsheets as valuable tools for personal finance will be covered.

Title	Code	Semester/Duration	Credits
INTERMEDIATE ACCOUNTING1	ACCT-222	3/Longitudinal	3

This covers the fundamental concepts of accounting and their impact on the business world and society as a whole. Emphasis will be on the recording of economic transactions, and preparation and analysis of financial statements.

Title	Code	Semester/Duration	Credits
MANAGERIAL ECONOMICS	ECON-214	3 /Longitudinal	3

This An introduction to the analysis of price determination in product and resource markets under varying market structures within parameters set forth in a capitalistic system. Topics deal with

both micro and macroeconomics. It presents tools for analysis widely used in business analysis and decision making.

Title	Code	Semester/Duration	Credits
MARKETING PRINCIPLES AND APPLICATIONS	MKTG - 215	3 /longitudinal	3

This course introduces the student to making effective marketing decisions in developing a marketing plan. It includes studies the process of planning and distributing goods and services to the marketplace. Topics covered include the marketplace and consumers, marketing plans, market analysis, the marketing mix, and global marketing, product planning, pricing, promotion, and distribution. Emphasis will be on the application of marketing principles to real world business cases.

Title	Code	Semester/Duration	Credits
BUSINESS LAW	BUSN-216	3/Longitudinal	2

This is a study of the legal environment of business. Special emphasis is placed on using economic analysis to examine laws of property, contract and tort affecting business. The ethical foundations of law and ethical issues involving business are also emphasized. Specific topics generally include topics such as commercial free flow, product liability, cyber law, copyright, trademark and patent law. Corporations; proprietorships; product liability; contracts; federal agencies; conditions of employment; business ethics; bankruptcy.

Title	Code	Semester/Duration	Credits
MACROECONIMCS	ECON-217	3 / Longitudinal	2

Thi The course studies the market as a whole and how an economy functions focusing on aggregate relationships. It develops measures and theories of economic performance to study such issues as unemployment, inflation, and business cycles. Areas of study include aggregate supply and demand, fiscal policy, money and banking, monetary policy, economic growth, impacts of government budget and deficit financing, and consequences of international trade and finance, and the level of national production. Examines government policies designed to correct for unemployment and inflation with close attention to the use of fiscal and monetary policies.

Semester 4

Title	Code	Semester/Duration	Credits
COST ACCOUNTING	ACCN-412	4/Longitudinal	3

This is an in-depth study of accounting principles, accounting processes, financial statements, current and fixed assets, intangibles, liabilities, and stockholders' equity. Original pronouncements issued by the Accounting Principles Board and the Financial Accounting Standards

Board are integrated with materials and assigned cases. It involves an in-depth study of shareholders' equity, earnings per share, investments, revenue recognition, accounting for income taxes, pensions and post-retirement benefits, and cash flows.

Title	Code	Semester/Duration	Credits
INTERMEDIATE ACCOUNTING2	ACCT-412	4/Longitudinal	3

This describes In-depth study of accounting principles, accounting processes, financial statements, current and fixed assets, intangibles, liabilities, and stockholders' equity. Original pronouncements issued by the Accounting Principles Board and the Financial Accounting Standards Board are integrated with materials and assigned cases. It involves an in-depth study of shareholders' equity, earnings per share, investments, revenue recognition, accounting for income taxes, pensions and post-retirement benefits, and cash flows.

Title	Code	Semester/Duration	Credits
QUANTITATIVE METHODS	STAT-223	4/Longitudinal	3

The course gives students a basic introduction to the fundamental concepts and methods of statistics and application of statistical techniques to business problems.. Topics include: frequency distributions, measures of central tendency, measures of dispersion, fundamentals of probability, binomial distribution, estimation, confidence intervals and hypothesis testing for normal distributions, correlation, and simple linear regression.

Title	Code	Semester/Duration	Credits
DATA MANAGEMENT APPLICATIONS	INFO-226	4 /Longitudinal	3

The course outlines the role of data manipulation in the business environment. Students learn how to create, edit, and manipulate large volumes of data with Microsoft Access. Topics include basic design of reports, tables and forms, sorting, and inquiry. Other topics include relational databases and joins.

Title	Code	Semester/Duration	Credits
ORGANIZATION BEHAVIOUR	MGMT-227	4/Longitudinal	

This is an iintroduction to organizational behaviour, development, and theory; interpersonal communication; concepts of motivation and leadership; philosophy, principles, and values in organization; and development of critical managerial skills at the individual, interpersonal, and group levels.

Title	Code	Semester/Duration	Credits
FUNDAMENTALS OF FINANCIAL MANAGEMENT	BFIN-228	4/Longitudinal	3

This is a general study of advanced financial management to include time value of money,

working capital management, capital budgeting, financial planning, and control

Semester 5

Title	Code	Semester/Duration	Credits
FUNDAMENTALS OF FINANCIAL ACCOUNTING 1	ACCT-311	5/Longitudinal	3

The course covering all fundamentals of financial reporting throw the consolidated financial statements, construction contracts, coverage of substance of transactions and the limitations of financial statements.

Title	Code	Semester/Duration	Credits
FINANCIAL MANAGEMENT	BFIN-311	5/Longitudinal	3

This is a general study of financial management to include time value of money, working capital management, capital budgeting, financial planning, and control.

Title	Code	Semester/Duration	Credits
Fundamentals of Computer INFORMATION SYSTEMS	INFO-311	5/Longitudinal	3

This is a study of information systems in business environments including database organization and management, transaction processing, office automation, decision support systems, and approaches in system development.

Title	Code	Semester/Duration	Credits
MANAGEMENT OF ORGANIZTIONAL BEHAVIOUR	ECON-313	5/Longitudinal	3

This course covers the principles of human behaviour analysis in the organization & the impact of individual behaviour in work the relationship between individual &groups& the impact of I towards the efficiency of the organization,the concept of personality &its characteristics,the concept of motivations rewards.

Title	Code	Semester/Duration	Credits
AUDITING THEORY &PRACTICE	BFIN-415	5 /Longitudinal	3

papers, internal control, and the ethical and legal resp

This course describes auditing standards, procedures, programmes, manual and computer-assisted working onsibilities of the certified public accountant.

Title	Code	Semester/Duration	Credits
MONEY AND BANKING System	ECON-313	5/ Longitudinal	3

This is a study of the financial sector of the economy including commercial banks, thrifts, and other depository institutions. It examines the meaning and determinants of the money supply, credit and interest rates. Close attention will be paid to the role of the Central Bank and the economic effects of its monetary policy.

Title	Code	Semester/Duration	Credits
BUSINESS ETHICS AND SOCIAL RESPONSIBILITY	MGMT-419	5/longitudinal	3

This is a study of the impact of business on society and of developing guidelines for managing this impact. It emphasizes current issues in business/society relationships. in business/society relationships.

Title	Code	Semester/Duration	Credits
FUNDAMENTAL OF MANAGERIAL ACCOUNTING	ACCT-221	5 /Longitudinal	3

This is course emphasizes how organizational managers use accounting information to support their functions of planning, control, and decision-making. Elementary financial accounting; compound interest and time value of money; sources of capital; cost estimating; depreciation; risk and insurance; personal finance Examples taken from corporations, small business, and not-for-profit organizations.

Title	Code	Semester/Duration	Credits
STATISTICS INFERENCE	STAT-316	5/Longitudinal	3

This course provides an applied descriptive statistics and probability. Students will study foundations of classical parametric inference: point estimation, confidence intervals, hypothesis testing, and common statistical techniques, including simple regression and correlation. The use of statistical methods for managerial decision making. Emphasis is on understanding concepts, including inferences from sample data and model formulation, as aids in decision-making.

Title	Code	Semester/Duration	Credits
FINANCIAL MANAGEMENT	MGMT-3I8	5/Longitudinal	3

Principles of financial management concepts are addressed from the business manager's perspective. Key concepts will include preparing and managing the department budget, compiling a cost-benefit analysis for procurement of departmental resources, applying cost accounting concepts including time value of money, and understanding and analyzing business financial statements and reports.

Title	Code	Semester/Duration	Credits
INTERNATIONAL ECONOMICS	ECON-321	5 /Longitudinal	3

This includes the theory, policy, and institutions of international trading and monetary relations. The topics include the theory of international trade, a simple model of production, general equilibrium and trade and the growth of the international economy.

Semester 6

Title	Code	Semester/Duration	Credits
INTERNATIONAL MANAGEMENT	MGMT-312	6/Longitudinal	3

This course examines the environment and nature of international trade and investment; the impact of globalization; organizing and managing international operations; the role of .culture and politics; and multinational enterprises

Title	Code	Semester/Duration	Credits
PRODUCTION MANAGEMENT	MGMT-324	6/Longitudinal	3

This course describes the operational issues and problems related to the design and implementation of an organization's production process. Topics include production planning and analysis, inventory and quality control, scheduling, and methods for evaluating production performance in both the goods and service sectors of the economy.

Title	Code	Semester/Duration	Credits
PROJECT MANAGEMENT	MGMT-325	6 /Longitudinal	3

This This course presents the methods of project management at an introductory level. Techniques in project initiation and project implementation are discussed. Topics include project selection, project organization, project planning, budgeting and cost estimation, scheduling, resource allocation, project control, and project auditing.

Title	Code	Semester/Duration	Credits
OPERATIONS MANAGEMENT	MGMT-326	6/Longitudinal	3

This An overview of operations decisions in manufacturing and service firms. Topics include operations strategy, quality management, management of technology and innovations, inventory control, and project management. Computer exercises are required.

Title	Code	Semester/Duration	Credits
TOTAL QUALITY MANAGEMENT	MGMT-424	6 /Longitudinal	3

This course is a study of the history, principles and techniques of quality assessment and performance improvement programmed; review of utilization of cost-containment programmed; risk management and the application of evaluation techniques in different business settings. Other topics include computer software applications related to performance improvement, data retrieval and report design, organizational assessment and benchmarking, and quality improvement methods.

Title	Code	Semester/Duration	Credits
HUMAN RESOURCE MANAGEMENT	MGMT-411	6 /Longitudinal	3

This course introduces the student to an overview of the background of human resource management, acquisition of human resources, training and development of employees, compensation of human resources, and labour relations. Topics covered include human resource planning, recruitment, selection and training, equal opportunity and employment laws, job analysis and design, performance management systems, compensation and benefits, and employee/labour relations.

Title	Code	Semester/Duration	Credits
COMPUTER PROGRAMMING	INFO-312	6/Longitudinal	3

This course is an examination of the nature and capabilities of the computer. Producing and creating art, and literature using a computer. It includes an outline of the computer and the mind, artificial intelligence, programmed that learn. It covers explorations, simulations, and experiments using a computer. No prior computer programming experience presumed.

Title	Code	Semester/Duration	Credits
FUNDAMENTALS OF FINANCIAL ACCOUNTING 2	ACCT-312	6/Longitudinal	3

This course comprises description of the structure and objectives of the international accounting standards committee (IASC), and the international financial reporting interpretations committee (IFRIC), in addition of preparation of entities financial statements in accordance with prescribed structure and contents

Semester 7 and 8

Title	Code	Semester/Duration	Credits
ANALYSIS OF CONSUMER BEHAVIOUR	MKTG-411	7 /Longitudinal	3

Students investigate consumers' purchase activities and the activities used by marketers and public policy actors to influence consumers' purchase processes. Discussion of both the plea-

sures and the dark side of the consumer behaviour of many different types of consumers-women and men of all ages and economic, social, cultural, and ethnic backgrounds.

Title	Code	Semester/Duration	Credits
INTERNATIONAL ACCOUNTING	ACCT-411	7 /Longitudinal	3

This course introduces students to the international dimensions of accounting, financial reporting and financial control, besides proper understanding of inflation and it investigates the impact of exchange rates in financial reports and uniformity in preparing financial reports according to the international standards.

Title	Code	Semester/Duration	Credits
BUSINESS INFORMATION SYSTEMS	INFO-411	7 /Longitudinal	3

This is the study of information systems in business environments including database organization and management, transaction processing, office automation, decision support systems, and approaches in system development with particular attention directed at building skills and knowledge to prepare students to be users, managers, and developers of information systems.

Title	Code	Semester/Duration	Credits
SUPPLY CHAIN MANAGEMENT	MKTG-412	7 /Longitudinal	3

Supply chain management examines functional (Plan, Buy, Make, Move, and Sell) integration beyond the boundaries of the firm, including those performed by its customers, suppliers, and intermediaries. The supply chain is an end-to-end process running from suppliers to customers that is linked by operational strategies and information technologies. This course provides a strategic and tactical framework for analyzing the entire supply chain in a global context that encompasses all firms, activities, and functions necessary to bring a product or service from the point of origin to the point of consumption.

Title	Code	Semester/Duration	Credits
ADVANCED ORGANIZATIONAL BEHAVIOUR	MGMT-412	7/Longitudinal	3

This describes the applications of behavioural science concepts to work settings. Topics include worker incentives and perceptions toward work, group versus individual decision making, conflict resolution, interpersonal and leadership skills, and the study of other behaviours relevant to effective managing of a business organization.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO INVESTMENT AND FINANCIAL ANALYSIS	BFIN-313	7/ Longitudinal	3

These are the fundamentals of investing in stocks, mutual funds, derivatives, and other marketable securities. Securities markets, mechanics of trading, techniques of analysis, diversification, and valuation of assets are included.

Title	Code	Semester/Duration	Credits
DATABASE CONCEPT FOR BUSINESS	INFO-412	7/Longitudinal	6

This course covers database design and implementation. The relational database model is stressed. A database language that includes SQL and embedded SQL will be used.

Title	Code	Semester/Duration	Credits
ORGANIZATION DESIGN	MGMT-413	7 /Longitudinal	3

Is bureaucracy good or bad? Are organic organizations better than mechanistic organizations? Form follows function, and thus an organization's design must be appropriate to its environment and its purpose. This course examines organizational designs and processes in their internal and external contexts, and shows the student how to design an organization to operate efficiently in its unique situation.

Title	Code	Semester/Duration	Credits
MARKETING RESEARCH	MKTG-413	7 /Longitudinal	3

Methods and techniques used in marketing problem analysis including problem definition, hypothesis formulation, sampling techniques, questionnaire preparation, field surveys, data tabulation, and research results presentation.

Title	Code	Semester/Duration	Credits
INFORMATION RESOURCE MANAGEMENT	INFO-413	7 /Longitudinal	3

This course is a study of the application of management techniques needed to control information in an organization. Emphasis on providing organizations with accurate, readily available information to assist in management decision making, to provide litigation support, to improve organizational efficiency, to document compliance with legislative and regulatory requirements, and to provide a historical reference.

Title	Code	Semester/Duration	Credits
ACCOUNTING INFORMATION SYSTEMS	ACCT-414	7/Longitudinal	6

This is an introduction to manual and computer-based accounting information systems and concepts, processes, and procedures characteristic of manual and of computer-based accounting information systems. Particular attention is given to the analysis, design, and development of these systems with appropriate consideration of internal control.

Title	Code	Semester/Duration	Credits
SALES AND SALES MANAGEMENT	MKTG-414	7 /Longitudinal	3

An introduction to personal selling and the management of sales organizations including the preparation of sales presentations, the techniques of effective selling, development, budgeting, compensating, and evaluating the sales force.

Title	Code	Semester/Duration	Credits
OPERATING SYSTEMS	INFO-414	7 /Longitudinal	3

This is a study of resource management implemented by an operating system in multiprogramming environment with respect to CPU, memory, file, and device. It emphasizes on programming techniques leading to system software design, development, and implementation.

Title	Code	Semester/Duration	Credits
PERISPECTIVE ON INTERNATIONAL BUSINESS	BUSN-415	7/Longitudinal	3

This is a survey course that examines contemporary topics and concepts of international trade and investment. It examines the environment in which international business operates and the nature of international trade and investment; organizing and managing international operations; the role of culture and politics; and multinational enterprises.

Title	Code	Semester/Duration	Credits
MARKETING MANAGEMENT	MKTG-415	7 /Longitudinal	3

This includes procedures for planning, implementing, and evaluating marketing strategy. The topics include strategic and marketing analysis, strategic direction and formulation and strategic evaluation.

Title	Code	Semester/Duration	Credits
COMMUNICATION TECHNOLOGY1	INFO-415	7 /Longitudinal	3

This course is an overview of the broad field of data and telecommunications, including voice, data, message, and image communication.

Title	Code	Semester/Duration	Credits
FINANCIAL INSTITUTIONS	MKTG-416	7 /Longitudinal	3

Examines the role of financial institutions in savings, money creation and management, how they create credit for investors, importance of financial institutions for the national economy; the role of the central bank, the money market and capital market and the stock exchange and the international financial institutions.

Title	Code	Semester/Duration	Credits
ADVERTISING	MKTG-419	7 /Longitudinal	3

This course describes the management of the advertising function; introduction to the creative elements of an advertisement, including copy, layout, media choice; advertising's role in a marketing plan; and measuring advertising effectiveness.

Title	Code	Semester/Duration	Credits
HEALTH INFORMATICS	INFO-417	7 /Longitudinal	3

This course is a study of computer applications in the management of systems to collect, store, process, retrieve, analyze, disseminate, and communicate health related information. Study of work simplification, system analysis and graphic representation techniques are covered. Other topics include data security, local and wide area network data definitions, data administration, database structures, data dictionaries, data modeling, and database administration.

Title	Code	Semester/Duration	Credits
SMALL BUSINESS MANAGEMENT	MGMT-422	7/Longitudinal	3

This describes the oopportunities and problems of small business in the U.S. Emphasizes aspects of management unique to small firms. It examines entrepreneurship and management of a wide variety of small businesses.

Title	Code	Semester/Duration	Credits
ADVANCED ACCOUNTING	ACCT-423	8 /Longitudinal	3

This course is a series of advanced topics including parent-subsidiary relationships, consolidated financial statements, international and fund accounting, and accounting for leases. Emphasis on preparation of consolidated working papers, manual and computer assisted.

Title	Code	Semester/Duration	Credits
AUDITING THEORY &PRACTICE	BFIN-415	8 /Longitudinal	3

This course describes auditing standards, procedures, programmes, manual and computer-assisted working onsibilities of the certified public accountant.

Title	Code	Semester/Duration	Credits
STRATEGIC MANAGEMENT	MGMT-416	8/Longitudinal	3

The course integrates what the student has learned from various business disciplines and applies this integrative thinking to the firm's actions and outcomes. It illustrates how planning, implementation, and adaptation are necessary components of strategic management under conditions of rapid change and unpredictability. Technology, innovation, globalization, and linkages between organizational behaviour and firm strategy are stressed. The course emphasizes current business practices taught through case analysis, research, writing, and presentations.

Title	Code	Semester/Duration	Credits
INTERNAL AUDITING	BFIN-424\2	8/Longitudinal	3

The course describes the organization of the internal audit department, staff qualifications and development, long- and short-range audit plans, and the elements of internal auditing, i.e., preliminary survey, audit programmes, field work activities, reporting, and management review.

Title	Code	Semester/Duration	Credits
GOVERNMENT ACCOUNTING	ACCT-427	8/Longitudinal	3

The course is an overview of government and national accounting principles; Topics include: financial structure of the national economy and markets; managing exchange rate risks and hedging; government budgeting; The organization of the government audit department, staff qualifications and development, long- and short-range audit plans, and the elements of internal auditing.

Title	Code	Semester/Duration	Credits
SOFTWARE ENGINEERING	INFO-421	8/Longitudinal	3

The course is a study of software engineering as an application of tools, methods, and disciplines to produce and maintain an automated solution to a real-world problem. Software engineering emphasizes the identification of a problem, a computer to execute a software product, and an environment (composed of people, equipment, computer, documentation, and so forth) in which the software product exists.

Title	Code	Semester/Duration	Credits
INTERNATIONAL MARKETING	MKTG-422	8 /Longitudinal	3

This course examines all of the adjustments necessary to develop an effective marketing strategy for application in multinational or global markets. The topics include marketing and economic growth, international trade and approaches to marketing in foreign environments.

Title	Code	Semester/Duration	Credits
MANAGING INFORMATION TECHNOLOGY	INFO-422	8 /Longitudinal	3

This course Covers principles and concepts of information management at the operational, tactical, and strategic levels. Includes but is not limited to CIO leadership responsibilities, information planning, reengineering, legal and professional issues, economics, and strategic impact of information systems on organizations.

Title	Code	Semester/Duration	Credits
E- MARKETING	MKTG-423	8 /Longitudinal	3

This course examines the new concepts of electronic marketing and marketing through the internet. Includes what is electronic marketing and its importance in economic development and the activities of international trade; regulatory bodies and international regulations that affect the trade through the internet; international economic blocks and promoting and doing business through the world wide web.

Title	Code	Semester/Duration	Credits
PROGRAMMING FOR BUSINESS APPLICATIONS	INF-423	8/ Longitudinal	3

This is an introduction to a business computer language other than COBOL. It examines commercial applications of programming and dealing with different data management systems. What are data bases, files and fields, design of data bases.

Title	Code	Semester/Duration	Credits
BUSINESS ETHICS AND CORPORATE SOCIAL RESPONSIBILITY	MGMT- 425	8/longitudinal	3

This is a study of the impact of business on society and of developing guidelines for managing this impact. It emphasizes current issues in business/society relationships. in business/society relationships.

Title	Code	Semester/Duration	Credits
WEB PAGE DEVELOPMENT	INFO-424	8 /Longitudinal	3

This course provides a guide to students in developing Web applications using a scripting language. An example of such a language is JavaScript. Students will learn how to integrate fundamental programming structures into code used for Web applications. Examples of Web applications include managing client-side responses to Web visitors, input data validation on retail order forms, creation and use of objects and functions, animation, and animation with cascading style sheets. Concepts of object-orientation including objects, properties, methods, and events and the JavaScript Object Model are an integral part of this course.

Title	Code	Semester/Duration	Credits
COMMUNICATION TECHNOLOGY2	INFO-424	8 /Longitudinal	3

This course is an overview of the Advance broad field of data and telecommunications, including voice, data, message, and image communication.

Title	Code	Semester/Duration	Credits
ORGANIZATIONAL PSYCHOLOGY	PSYC-423	8/Longitudinal	3

This course examines current theory and issues in organizational psychology. It has an applied emphasis and should prepare a student for entry and participation in business organizations.

Title	Code	Semester/Duration	Credits
TOTAL QUALITY MANAGEMENT	MGMT-424	8 /Longitudinal	3

This course is a study of the history, principles and techniques of quality assessment and performance improvement programmed; review of utilization of cost-containment programmed; risk management and the application of evaluation techniques in different business settings. Other topics include computer software applications related to performance improvement, data retrieval and report design, organizational assessment and benchmarking, and quality improvement methods.

Title	Code	Semester/Duration	Credits
ADVANCED ACCOUNTING	ACCT-423	8 /Longitudinal	3

The course aims to develop knowledge of events after advance accounting 2 statement (Sub sidiaries - Associates) the reporting period, and statement of cash flow. the course introduces the candidate to interpret financial statements and preparing simple consolidate financial

Title	Code	Semester/Duration	Credits
CAPITAL BUDGETING	BFIN-413	8 /Longitudinal	3

This course describes the management of long-term assets and liabilities under condition of uncertainty, cost of capital, and mergers. It includes extensive use of problems and cases.

Title	Code	Semester/Duration	Credits
TAXATION	BFIN-422	8 /Longitudinal	2

This is an introduction to tax laws, preparation of tax for business, and specific tax problems relating to individuals and business.

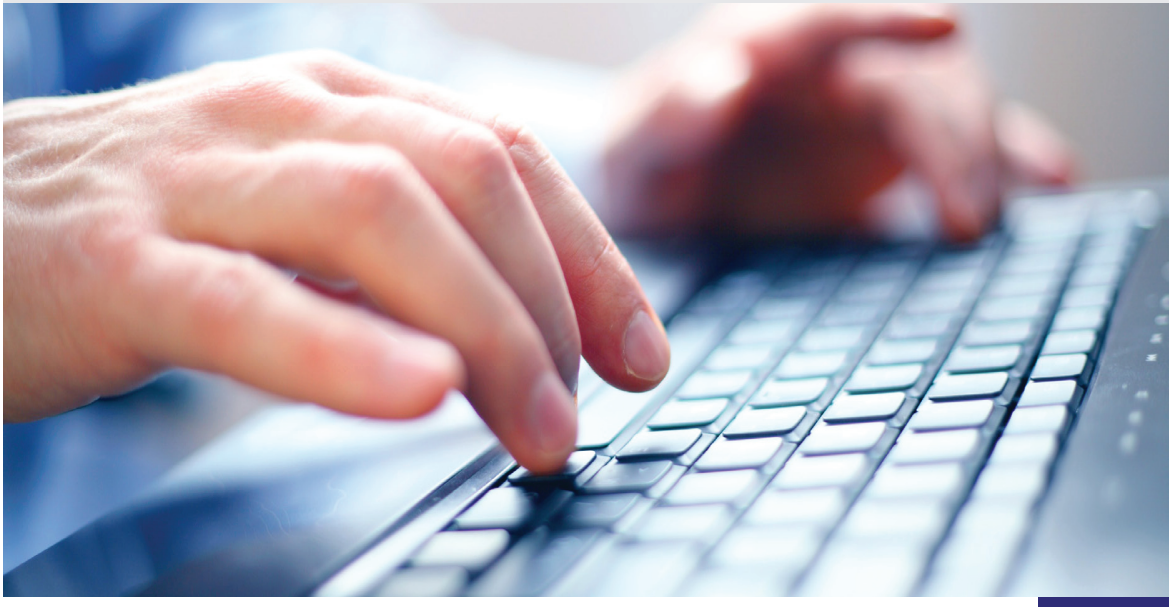
Title	Code	Semester/Duration	Credits
GRADUATION PROJECT	GRAD-424	8/Longitudinal	4

This is an independent study research project involving an in-depth exploration into a business (marketing, accounting or information) topic chosen by the student in consultation with a faculty member.

FACULTY OF

COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNDERGRADUATE & GRADUATE PROSPECTUS



VISION AND MISSION

The VISION of Computer Science department is to be recognize locally and regionally as a leading department providing high quality education, researches and services.

The MISSION is to upgrade human capacity in all areas of computer Science, using modern scientific methods, while contributing to the community service and the competencies required to contribute to the advancement of scientific research.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Computer and Health Informatics, has to:

1 - Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology or computer sciences or engineering scienes. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.

3 - Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Computer and Health Informatics.

4 - Pay the published fees:15,000 SDG or US $ 3000 [international students] (2018)

CAREER ADVICE

This program prepares graduates possess practical knowledge of the foundations of the theory and application capabilities in the analysis, design and implementation of the required questions solutions to improve the performance of organizations. Therefore, the job opportunities will be available for graduates of this program in many areas, including:

- Working with software companies.
- Telecommunications sectors.
- Banks and financial organizations.
- Academic and educational institutions.
- Governmental organizations.

FACULTY OBJECTIVES

The objectives of the National University Faculty of Computer Science and Information Technology are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the National University philosophy and message.
2. To provide the necessary workers to bring about a renaissance of computer technology in the country.
3. To localize of knowledge in the field of computer science in the country.
4. To build the computer society.
5. To develop algorithms for the software solutions to solve the problems of national organizations.
6. To provide community service based on conducting scientific studies and applied research in the areas of Computer Science that have a direct impact on development in the community.
7. Strengthen computer science research, making use of the University's accessibility and communication privileges.

Curriculum Objectives

[Characteristics of the Computer Science gradute

A graduate of the National University Computer Science Curriculum should be able to:

1. Adopt the strategies of the National University-Sudan and abide by its objectives and rules stated in its charter.
2. Integrate his/her background knowledge in business management, information systems, computer science and health care and using it effectively in any position in Information systems in the health industry and organization.
3. Improve and develop the organization.

4. Exploit the opportunities provided by technical inventions in developing the business and organization.
5. Analyze a problem, and identify and define the computing requirements appropriate to its solution.
6. Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
7. Secure data and technical infrastructure of the organization.
8. Understand and manage the risks of using computer science applications in the organization.
9. Communicate effectively with a range of audiences
10. Work in a team.
11. Conduct scientific research in the field of computer science.

Feedback to students after mid-course and end of course assessment is an essential part of the computer science programme

EDUCATIONAL STRATEGIES AND METHODS

Emphasis on learning strategies include: (1) Practice plan to purchase basic skills in Computer applications, communication and information technology in an organizations, (2) learning student-centred, and responsibility maximum in the learning process of students, and (3) based on problem-solving and learning-oriented problem, (4) community-oriented activities of the community and, (5) the integration of basic and community science and practice and training in communications companies (6) and self-peer teaching and assessment, (7) the team approach, (8) and a wide range of optional, (9) continuous assessment, (10) preparation for continuing education.

Faculty of Computer Science and Information Technology adopt the following methods in the daily programme of activities: (1) (Sessions- learning) based on the solution of problems (2) Seminars and discussions small group (3) Practice in communications companies is essential part of the curriculum (4)Practicing in the computer laboratories is essential part of the curriculum (5) lectures (6) Educational activities, duties and reporting and research activities (according to the nature of the subject) (7) Elective courses.

Feedback to students after mid-course and end-of course assessments is a must in the computer science programme.

TIMETABLE

The BSc. (Honour) Computer Science programme (BSc. CS))requires four years (8 semesters).

Study Plan for the program include 169 credit hours Bachelor degree in Computer Science (Honor). Two semesters per academic year, 15-18 weeks length of each semester. This period does not include examinations that take place at the end of each semester. The program

supports a continuous assessment system that may contain exams, practical applications, tutorials, seminars and tests.

The Plan includes research project for graduation of 6 credit hours.

The programme schedule therefore involves considerable commitment from students to be on time at the respective sites specified in their daily timetables. Each student should have a functioning e-mail address for last moment changes, a frequent incident in field training programmed

StRUCTURE OF COMUTER SCIENCE CURRICULUM

Semester 1 [21 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Islamic Studies-1	ISLAM-111	Longit.	2	-	-	2
2	Arabic Language-1	ARAB-112	Longit.	2	-	-	2
3	English Language-1	ENG-113	Longit.	2	-	-	2
4	Islamic Studies-2	ISLAM-121	Longit.	2	-	-	2
5	Arabic Language-2	ARAB-122	Longit.	2	-	-	2
6	English Language-2	ENG-123	Longit.	2	-	-	2
7	Sudanese studies-1,2	SUDN-114. 124	Longit	4	-	-	4
8	Introduction to Computer Science	COM-115	Longit.	-	2	3	3
			18	12	14	3	19

Semester 2 [23 CHs- 18 weeks]

	Title	Code	Weeks		Units		CH
				Th	Tut	Prac	
1	Discrete Mathematics	MAT-116	Longit.	2	2		3
2	Principles of Economic	HMS-117	Longit.	2	2		3
3	Calculus (1)	MAT-114	Longit.	2	-	-	2
4	Principles of Accounting	HMS125	Longit.	2	2	-	3
5	Principles of Programming	COM126	Longit.	2	0	3	3
6	Algebra and Geometry	MAT127	Longit.	2	2	-	3
7	Calculus (2)	MAT128	Longit.	2	2	-	3
			18	16	12	3	20

Semester 3 [24 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Digital Systems	COM211	Longit.	2	2	-	3
2	Programming Methods (1)	COM212	Longit.	2	-	3	3
3	Differential Equations	MAT213	Longit.	2	2	-	3
4	Multimedia	INT214	Longit.	2	-	3	3
5	Database Concepts	COM215	Longit.	2	-	3	3
6	Statistics & Probabilities(1)	MAT216	Longit.	2	2	-	3
7	System Analysis & Design(1)	SYS217	Longit.	2	2	-	3
8	Numeric Computation (1)	MAT218	Longit.	2	2	-	3
			18	16	10	9	24

Semester 4 [24 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Computer architecture and organization	COM221	Longit.	2	-	3	3
2	Human - Computer interaction	INT222	Longit.	2	-	3	3
3	Statistics & Probabilities(2)	SYS223	Longit.	2	2	-	3
4	Database programming	COM224	Longit.	2	-	3	3
5	Algorithms and Data Structure	COM225	Longit.	2	-	3	3
6	Numeric Computation (2)	MAT226	Longit.	2	2	-	3
7	Operational Research	MAT227	Longit.	2	2	-	3
8	Internet Technology	INT228	Longit.	2	-	3	3
			18	16	6	15	24

Semester 5 [21 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Programming Methods (2) (OOP)	COM311	Longit.	2	-	3	3
2	Computer Networks and Communications	INT312	Longit.	2	-	3	3
3	Database Applications	SYS313	Longit.	2	-	3	3
4	Software Engineering (1)	SWE314	Longit	2	-	3	3
5	Visual Programming	COM315	Longit	2	-	3	3
6	Algorithms Analysis and Design	COM316	Longit	2	2	-	3
7	Compilers Design	COM317	Longit.	2	2	-	3
			18	14	4	15	21

Semester 6 [21 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Software Engineering (2)	SWE321	Longit.	2	-	3	3
2	Operating Systems Concepts	COM322	Longit.	2	-	3	3
3	Open Source Software & Technologies	INT323	Longit.	2	-	3	3
4	Research Methodology	HMS324	Longit.	2	2	-	3
5	Computer Graphics and Visualization	COM325	Longit.	2	-	3	3
6	Data Mining	COM326	Longit.	2	2	-	3
7	E-commerce	INT327	Longit.	2	2	-	3
			18	14	6	12	21

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Semester 7 [18 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Information Security	INT411	Longit.	2	2	-	3
2	Parallel and Distributed Computing	COM412	Longit.	2	2	-	3
3	IT Project Management	INT413	Longit.	2	2	-	3
4	Artificial Intelligence	COM414	Longit.	2	-	3	3
5	Simulation and modelling	COM415	Longit.	2	-	3	3
6	Elective (1)	COM416	Longit.	2	-	3	3
			18	12	6	9	18

Semester 8 [17 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Mobile Device Programming Technologies	INT421	Longit.	2	-	3	3
2	Professional Ethics	HMS422	Longit.	2	-	-	2
3	Elective (2)	COM423	Longit.	2	2	-	3
4	Elective (3)	COM424	Longit.	2	-	3	3
5	Graduation project	COM425	Longit	-	-	18	6
			18	8	2	24	17

COURSE OUTLINE

Detailed behavioural objectives, skills, assignments and problems are listed in each course book. The lists are too extensive to be included below. Courses in the curriculum timetable not outlined below are included in other programmed, or in the original document with the programme coordinator.

Title	Code	Semester/Duration	Credits
CALCULUS -1	MAT114	Longitudinal/1	(2,2,0)3

This introductory calculus course covers differentiation and integration of functions of one variable, with applications. Topics include: concepts of function, limits and continuity, differentiation rules, application to graphing, rates, approximations, and extremum problems, the fundamental theorem of calculus, applications to differentiation

Title	Code	Semester/Duration	Credits
PRINCIPLES OF COMPUTER SCIENCE	COM115	Longitudinal/1	(2,0,3)3

The course provides students with a broad foundation in computer science. Topics include: introduction to digital technology, historical review; logic gates; binary, octal, and hexadecimal systems; computer architecture and basic components, internal and external interfaces, types of removable media; introduction to operating systems; programming paradigms, basic programming concepts; concept of algorithm, representation, correctness and performance of algorithms; introduction to objects. The course equips students with basic problem solving skills and prepares them for taking the programming sequence subjects and other computer science disciplines.

Title	Code	Semester/Duration	Credits
DISCRETE MATHEMATICS	MAT116	Longitudinal/1	(2,2,0)3

Propositional logic, predicate logic and quantification, methods of proof, sets and functions, arithmetic algorithms, growth of functions, computational complexity of algorithms, integer properties and matrices, mathematical induction, recursion, sequences and summations, program correctness, graphs and its applications, trees and its applications, languages and grammars, finite-state machines, automata and language recognition, turning machines

Title	Code	Semester/Duration	Credits
PRINCIPLES OF ECONOMICS	HMS117	Longitudinal/1	(3,0,0)3

The course topics: language of economics, types of economies and economic systems and institutions, the graph - tool of the economist: a math review, production possibility frontiers - opportunity costs and efficiency, the market economy - supply and demand, consumer and producer surplus, elasticity of supply and demand, individual choice: the theory behind demand, theory of the firm: supply production, and costs, perfect competition, monopoly, monopolistic competition, oligopoly, and strategic pricing, wage and interest determination, the government in the economy

Title	Code	Semester/Duration	Credits
PRINCIPLES OF ACCOUNTING	HMS125	Longitudinal/2	(2,2,0)3

Course orientation: overview of classroom policies and expectation, Introduction to accounting and business, analysing transactions, the adjusting process, completing the accounting cycle, accounting for merchandising businesses, nature of merchandising business, financial statement s for a merchandising business, merchandising transactions, the adjusting and closing process, the periodic inventory system, inventories, control of inventory, inventory cost flow assumptions, inventory costing methods, reporting merchandise inventory in the financial statements, estimating inventory cost, cash, bank rand petty cash.

Title	Code	Semester/Duration	Credits
PRINCIPLES OF PROGRAMMING	COM126	Longitudinal/2	(2,0,3)3

Computer structure and Algorithms (Computer structure. Low and high languages, Compiling, running and debugging). The components of JAVA language (Types in JAVA, variables, assignment and conditional statements), Loop statements (The FOR statement, the WHILE statement, the DO-WHILE statement and casting), Arrays (Arrays declaration , multidimensional arrays, Class String and string methods.),Methods in Java (Principles of procedural programming. Top-down design of a program, modulation, passing parameters to method, static methods).Sorting and searching algorithms (Selection sort, insertion sort, bubble sort,Searching methods) ,Recursion 1 (Recurrence as an alternative to iteration. Different kinds of recursion),Recursion 2 (Recursion and arrays Towers of Hanoi problem),Principles of object-oriented programming(OOP) (Class definition: attributes and methods, Constructors (copy, default), Setter and Getter methods, references to object, encapsulation).Inheritance (Creating subclasses, overriding methods, class hierarchies).Collections, composite objects, self referential objects (Dynamic data structures:stack,linked lists, two way linked list),Advanced Input /Output: Streams and Files (Basic file manipulations in JAVA), Review (Review on the whole material following above)

Title	Code	Semester/Duration	Credits
LINEAR ALGEBRA AND GEOMETRY	MAT127	Longitudinal/2	(2,2,0)3

This course cover: linear equations and matrices,Vector spaces, linear transformations.Inner products, orthogonalisation and projections, QR factorisations, reactions.Determinants. Eigen values and eigenvectors. orthogonal transformations. Symmetric matrices and quadratic forms, canonical forms for conics and quadrics, principal axes, diagonalisation of a quadratic form by completing the square and Sylvester's Law of Inertia. The Cayley-Hamilton Theorem. Jordan forms. Functions of matrices, Systems of ordinary differential equations.

Title	Code	Semester/Duration	Credits
CALCULUS-2	MAT128	Longitudinal/2	(2,2,0)3

This introductory calculus course covers integration of functions of one variable, with applications. Topics include: concepts of Integration, definite and indefinite integration, the fundamental theorem of calculus, applications to geometry: area, volume, and arc length, applications to science: average values, work, and probability, techniques of integration, approximation of definite integrals, improper integrals, and l'hôspital's rule.

Title	Code	Semester/Duration	Credits
DIGITAL SYSTENS	COM211	Longitudinal/3	(2,2,0)3

This course introduces students to the basic concepts of digital systems, including analysis and design. Both combinational and sequential logic will be covered. Students will gain experience with several levels of digital systems, from simple logic circuits to hardware description language and interface programming in C.

The following topics will be covered:

Number systems, Boolean algebra, binary arithmetic, logic gates, programmable logic, combinational logic and building blocks, synchronous sequential circuit design, latches, flip-flops, registers and counters, state machines, verilog and C programming

Title	Code	Semester/Duration	Credits
Programming Methods	COM212	Longitudinal/3	(2,0,3)3

Review of control structure, functions, and primitive data type, arrays, multi-dimensional arrays, more about methods, exceptions, recursion, classes & objects, inner classes. I/O techniques in java, file and other related classes (streams), strings, string processing and data representing in memory

Title	Code	Semester/Duration	Credits
DIFFERENTIAL EQUATIONS	MAT213	Longitudinal/3	(2,2,0)3

First-order differential equations, separable equations and applications, linear equations and applications, second-order differential equations, introduction, general solutions, homogeneous equations, free mechanical vibrations, nonhomogeneous equations, forced mechanical vibrations, the Laplace transform, Laplace transform and its inverse, transforms of derivatives and IVPs, shifting theorems, discontinuous inputs.

Title	Code	Semester/Duration	Credits
MULTIMEDIA	INT214	Longitudinal/3	(2,0,3)3

Topics include fundamentals of multimedia, media and data streams, sound/audio, image, graphics, video and animation, topics in data compression including coding requirements, source, entropy, and hybrid coding, JPEG, H.261, MPEG, MP3 and etc, computer technology issues such

as communication architecture, multimedia workstations, cache systems, storage systems and optical storage, multimedia operating system issues such as real-time operation, resource management, process management, file systems, and multimedia networking, multimedia synchronization, presentation requirements, reference model, and synchronization techniques, multimedia database issues such as data organization, indexing and retrieval, multimedia applications including digital libraries, system software, toolkits, conferencing paradigms, structured interaction support, and examples from video/audio/graphics conferencing, latest web technologies.

Title	Code	Semester/Duration	Credits
DATABASE CONCEPTS	COM215	Longitudinal/3	(2,0,3)3

This course covers database design and the use of databases in applications, with a short introduction to the internals of relational database engines. It includes extensive coverage of the relational model, relational algebra, and SQL. The course also features database design and relational design principles based on dependencies and normal forms. Many additional key database topics from the design and application-building perspective are also covered, including indexes, views, transactions, and integrity constraints. Systems such as MapReduce framework and key-value stores will also be covered. There will be a programming project, which explores database design and management in web applications by utilizing appropriate features of SQL.

Title	Code	Semester/Duration	Credits
OPERATING SYSTEMS	HC-COMP 213	Longitudinal	4

This course teaches the fundamentals of operating systems. The following topics are studied in detail: virtual memory, kernel and user mode, system calls, threads, context switches, interrupts, intercrosses communication, coordination of concurrent activities, and the interface between software and hardware. Most importantly, the interactions between these concepts are examined.

Title	Code	Semester/Duration	Credits
STATISTICS AND PROBABILITIES	MAT216	Longitudinal/3	(2,2,0)3

Exploring univariate data (types of data, mean and median, standard deviation and variance, range, IQR and finding outliers, graphs and describing distributions). Introduction to probability (counting techniques, combinations and permutations, sets and Venn diagrams, basic probability models, general probability rules), discrete distributions (random variables, binomial distributions, geometric distributions), continuous distributions (density curves, the normal distribution, standard normal calculations, sampling distribution of x and ˆp), bivariate data (scatter plots, correlation, the least squares regression line, residuals, non-linear models), relations in categorical data .

Title	Code	Semester/Duration	Credits
SYSTEM ANALYSIS AND DESIGN-1	SYS217	Longitudinal/3	(2,2,0)3

This module introduces the students to the concepts and skills of system analysis and design.

It includes expanded coverage of data flow diagrams, data dictionary, and process specifications, system analysis fundamentals, information requirements analysis, the analysis process, the essentials of design, software engineering and implementation

Title	Code	Semester/Duration	Credits
NUMERIC COMPUTATION -1	MAT218	Longitudinal/3	(2,2,0)3

This course covers introduction, motivation and applications, computation and error analysis, accuracy and precision; truncation and round-off errors; binary number system; error propagation, linear systems and equations, matrix representation; Cramer's rule; Gauss elimination; matrix inversion; LU , decomposition; iterative methods; relaxation methods; Eigen values, algebraic equations, bracketing methods: bisection, Reguli- Falsi; open methods: Secant, fixed point, iteration, Newton-Raphson; multivariate, Newton's method, regression and curve fitting, linear regression; least squares; total, least squares; interpolation; Newton's difference formulae; cubic splines.

Title	Code	Semester/Duration	Credits
COMPUTER ARCHITECTURE	COM221	Longitudinal/4	(2,0,3)3

The course will cover Introduction, history, logical circuits, boolean algebra; combinational circuits; fundamental and additional logical gates; Karnaugh maps; decoders; multiplexors; adders; number representation; ALU; latches; sequential analysis; registers; processors, registers sets; ISA; control unit; modern architectures

Title	Code	Semester/Duration	Credits
HUMAN-COMPUTER INTERACTION	INT222	Longitudinal/4	(2,0,3)3

What is interaction design? understanding and conceptualising interaction, understanding users, the process of interaction design, establishing requirements, prototyping, evaluation, observing users, emerging trends, student group presentation.

Title	Code	Semester/Duration	Credits
SYSTEM ANALYSIS AND DESIGN-2	SYS223	Longitudinal/4	(2,2,0)3

Fundamental knowledge, methods and skills needed to analyze and design computer-based systems, the role of the systems analyst, the techniques employed and relationships that need to be maintained, utilization of the structured software development life cycle approach, process modeling, information modeling, system architecture modeling, Object-Oriented modeling using UML. A project is given that covers analysis and design phases of a relatively data-oriented business case with emphasis on data modeling (ER diagrams), process modeling (DFDs), and architectural system design issues (DD, HIPO, IPO.

Title	Code	Semester/Duration	Credits
DATABASE PROGRAMMING	COM224	Longitudinal/4	(2,0,3)3

Data/Information & Processing; File based systems; Data Processing Modes; Types of Databases; Components of DBMS; History and objectives of the development of DBMS; Types of data models; Roles in the database environment; Database Architecture; Relational Algebra & Relational Calculus; Terminology of Relational Model; Associations/ Relationships; Types of Keys; Data Integrity; Views; Indexes; Design & Administration; Database system development life cycle; Phases and types of database design; Data Administration & Database Administration; ER-Modeling using UML; Normalization; Handling Problematic & Redundant data; Functional Dependencies; Transitive Dependencies; Identifying Normal Forms; Writing SQL Commands; Creating & Indexing the Tables; Formatting Query Results into Reports; Usage of SQL-Plus.

Title	Code	Semester/Duration	Credits
DATA STRUCTURES AND ALGORITHMS	COM225	Longitudinal/4	(2,0,3)3

Introduction to data structures and algorithms, arrays, sorting algorithms, searching algorithms, stacks, stacks applications, queues priorities queues, linked list, double linked list, stacks and queues applications using linked list, introduction to tree, binary tree.

Title	Code	Semester/Duration	Credits
NUMERIC CALCULATIONS -2	MAT226	Longitudinal/4	(2,2,0)3

Introduction, numerical differentiation, numerical differentiation; higher order formulae, integration and integral equations, trapezoidal rules; simpson's rules; quadrature. ODEs: initial value problems, Euler's methods; Runge-Kutta methods; predictor-corrector methods; adaptive step size; Stiff ODEs. ODEs: boundary value problems, shooting method; finite differences; over/ under relaxation (SOR). PDEs, introduction to partial differential equations.

Title	Code	Semester/Duration	Credits
OPERATIONS RESEACH	MAT227	MAT227	(2,2,0)3

Introduction to operations research (OR), introduction to foundation mathematics and statistics, linear programming (LP), LP and allocation of resources, LP definition, linearity requirement, maximization then minimization problems, graphical LP minimization solution, introduction, simplex method definition, formulating the simplex model. linear programming - simplex method for maximizing. simplex maximizing example for similar limitations, Mixed limitations, Example containing mixed constraints, minimization example for similar limitations, sensitivity analysis: changes in objective function, changes in RHS, the transportation model, basic assumptions. solution methods: feasible solution: The northwest method, the lowest cost method,Optimal solution: the stepping stone method, modified; distribution (MODI) method, the assignment model:- basic assumptions.

Title	Code	Semester/Duration	Credits
INTERNET TECHNOLOGIES	INT228	Longitudinal/4	(2,0,3)3

Introduction to HTML5: Introduction, editing HTML5,First HTML5 example,W3C html5 validation service, heading, linking, Images, special characters and horizontal rules, lists, tables, forms, internal linking, meta elements, new HTML5 form input types, input and data list elements and autocomplete attribute, page structure elements, introduction to cascading style sheets: inline styles, embedded style sheets, positioning elements, backgrounds, elements dimensions, box model and text flows, media types and media queries, drop down menus, text shadows, rounded corners, colour, box shadows, linear gradients, radial gradients, multiple background images, image borders, animation selectors, transitions and transformations, Java script: introduction to scripting, control statements, functions, arrays, objects, Java script event handling: reviewing the load event, event mouse move and the event object, rollovers with mouse over and mouse out, form processing with focus and blur, more form processing with submit and reset, event bubbling, more events introduction to canvas: canvas coordinate system, rectangles, using paths to draw lines, drawing arcs and circles, shadows, quadratic curve, Bezier curves, linear gradients, radial gradients, images, image manipulation, patterns, transformations, resizing the canvas to fill the browser, alpha transparency, compositing, save and restore methods, note on canvas SVG and canvas 3D, Ajax-enabled rich internet applications with XML and JSON: introduction, rich internet applications (RIAs) with Ajax, history of Ajax, "raw" Ajax example using the XML http, request object, using XML and the DOM, creating a full-scale Ajax-enabled application, web servers: introduction, HTTP transactions, multitier application architecture, Client-Side Scripting versus Server-Side Scripting, accessing web servers, Apache, SQL and PHP installation, Microsoft IIS Express and web matrix, PHP: introduction, simple PHP program, converting between data types, arithmetic operators, initializing and manipulating arrays, string comparison, string processing with regular expressions, form processing and business logic, reading from a database, using cookies, dynamic content.

Title	Code	Semester/Duration	Credits
OBJECT-ORIENTED PROGRAMMING	COM311	Longitudinal/5	(2,0,3)3

Definition of object oriented, inheritance, multiple inheritance, encapsulation, polymorphism, introduction to Interfaces, dealing with interfaces, packages, application cases, graphical user interface GUI, GUI application .

Title	Code	Semester/Duration	Credits
COMPUTER NETWORKS AND COMMUNICATIONS	INT312	Longitudinal/5	(2,0,3)3

Topics covered: basic concepts of networking, network topologies, the concept of layered architecture modeling including OSI and the TCP/IP protocol suite. client-server communications, physical layer functionalities including signaling, modulation, multiplexing, line coding and synchronization, transmission media, network performance measures

including throughput, delays are presented, data vs. signaling rates, channel bandwidth and capacity, link layer functionalities including frame synchronization, error detection and control including ARQ, flow control mechanisms including sliding windows, circuit, packet and virtual circuit switching technologies, local area network technologies including ETHERNET, token rings, multiple-access schemes such as CSMA/CD, CSMA/CA and token-passing. MAC addressing, switched vs. shared ETHERNETs, performance evaluation, including throughputs and delays, internetworking devices including repeaters, bridges, switches, routers and gateways, network layer protocols, including IP, ARP and ICMP. IP addressing schemes, sub-netting, internet routing including protocols used in the internet such as RIP, OSPF and BGP, transport layer protocols including UDP and TCP. ports and sockets. TCP connection establishment, error, flow and congestion control in TCP, applications layer protocols such as HTTP, FTP, DNS, SMTP, TELNET, network security measures including encryption, authentication, data integrity and firewalls.

Title	Code	Semester/Duration	Credits
DATABASE APPLICATIONS	SYS313	Longitudinal/5	(2,0,3)3

This covers: object-relational database systems and using them in programming and in web applications. Topics include: object-relational database systems, the relational data model, the PL-SQL language, SQL queries. Installing and using database systems, using graphical user interfaces for database management, programming database systems using database, middleware, programming web-based database application using middleware.

Title	Code	Semester/Duration	Credits
SOFTWARE ENGINEERING-I	SWE314	Longitudinal/5	(2,0,3)3

What is software engineering? Software lifecycle and process models, software engineering tools and programming environments, overview of software project management, software requirements specification, software design, using APIs, software verification and validation, and software evolution, software engineering tools for modeling such as: visual paradigm UML or rational rose will be covered in lab extensively covering flow-oriented modeling, behavioral modeling, scenario-base modeling and class modeling.

Title	Code	Semester/Duration	Credits
VISUAL PROGRAMMING	COM315	COM315	(2,0,3)3

Course introduction, syllabus, Introduction to computing, program design and implementation, essential VB, variables, data types, commenting, arithmetic operators and expressions, decision structures (ifs and select case), loops (while, for), loop applications (summation, counting), sub procedures (val and ref parameters), functions (val and ref parameters), strings, arrays, more arrays, files, databases.

Title	Code	Semester/Duration	Credits
ALGORITHMS ANALYSIS AND DESIGN	COM316	Longitudinal/5	(2,2,0)3

Introduction, algorithm definition, algorithm analysis, recurrence relations, design and analysis of algorithms: divide and conquer, Greedy algorithm, dynamic programming, lower bound theory, sorting and searching, NP-complete problems: basic concepts.

Title	Code	Semester/Duration	Credits
COMPLIERS DESIGN	COM317	Longitudinal/5	(2,2,0)3

Specific topics covered in this course include: overview of compilation , lexical analysis, context-free grammars, top-down and bottom-up parsing, error recovery, abstract syntax trees, symbol tables, lexical scoping, types (primitive, record, arrays, references), type checking, object-oriented type systems, subtyping, interfaces, traits, three-address code and other intermediate representations, code generation, data representation, memory management, object layout , code transformation and optimization, class hierarchy analysis, dataflow analysis, register allocation, run-time systems, just-in-time compilation, garbage collection

Title	Code	Semester/Duration	Credits
SOFTWARE ENGINEERING- II	SWE321	Longitudinal/6	(2,0,3)3

This course covers the software development process, from requirements elicitation and analysis, through specification and design, to implementation, integration, testing, and maintenance (evolution). A variety of concepts, principles, techniques, and tools are presented, encompassing topics such as software processes, project management, people management, software requirements, system models, architectural and detailed design, user interface design, programming practices, verification and validation, and software evolution. Although the emphasis will be on modern approaches, some more traditional software engineerig techniques will also be discussed.

Title	Code	Semester/Duration	Credits
OPERATING SYSTEMS	COM322	Longitudinal/6	(2,0,3)3

Course outline: overview: background, computer-system structures, operating system structures, process management: pand threads, process synchronization, deadlocks, CPU scheduling, storage Management: memory management, virtual memory, file-system interface, file-system implementation, I/O Systems: I/O, secondary-storage structure, distributed systems: network and distributed system structures, distributed file systems, distributed coordination.

Title	Code	Semester/Duration	Credits
OPEN-SOURCE SOFT WARE & TECHNOLOGIES	INT 323	Longitudinal/6	(2,0,3)3

Open source software: definitions and history where open source is successful: the good, the bad and the ugly, five immediate open source opportunities, five more open source

opportunities, open source server applications, open source desktop applications, how open source software is developed? Managing system implementation, application architecture, the cost of open source systems, exploring the android API, perspective and architecture overview,design philosophy,anatomy of an android application, application life cycle.

Title	Code	Semester/Duration	Credits
COMPUTER GRAPHICS	COM325	Longitudinal/6	(2,0,3)3

Introduction: history of computer graphics, graphics architectures and software, imaging: pinhole camera, human vision, synthetic camera, modeling vs rendering open GL: architecture, displaying simple two-dimensional geometric objects, positioning systems, working in a windowed environment colour: colour perception, colour models (RGB, CMY, HLS), colour transformations, colour in open GL, RGB and Indexed colour, input: working in a network environment, client-server computing; input measure, event, sample and request input, using callbacks, picking, geometric transformations: affine transformations (translation, rotation, scaling, shear), homogeneous coordinates, concatenation, current transformation and matrix stacks, three-dimensional graphics: classical three-dimensional viewing, specifying views, affine transformation in 3D, projective transformations. ray tracing, shading: illumination and surface modeling, Phong shading model, polygon shading. Rasterization: line drawing via Bresenham's algorithm, clipping, polygonal fill, BitBlt. Introduction to hidden surface removal (z buffer), discrete techniques: buffers, bitblt, reading and writing bitmaps and pixelmaps, texture mapping, compositing.

Title	Code	Semester/Duration	Credits
SCIENTIFIC RESEARCH METHODOLGIES	HMS324	Longitudinal/6	(2,2,0)3

Research techniques: basic research and applied research, data collection techniques, sampling techniques; data processing; research methods: subject selection, subject restriction, reference collection; definition of the problem or the subject in details, definition of solution techniques or analysis methods, researching and performing practical works, results; reporting: page set up, sentence structure, headings, abbreviation formats, figure and table formats, table of references format, computer application using SPSS is required.

Title	Code	Semester/Duration	Credits
DATA MINING	COM326	Longitudinal/6	(2,2,0)3

Introduction to data mining (DM), motivation for data mining, data mining-definition and functionalities, classification of DM systems, DM task primitives, integration of a DM system with a database or a data warehouse, issues in DM, KDD process, data pre-processing, why to pre-process data? - Data cleaning: missing values, noisy data, data integration and transformation, data Reduction: data cube aggregation, dimensionality reduction, data compression, numerosity reduction, data mining primitives, languages and system architectures: task

relevant data, kind of knowledge to be mined, discretization and concept hierarchy, concept description and association rule mining, what is concept description? Data generalization and summarization, based characterization, attribute relevance, class comparisons, association rule mining: market basket analysis, basic concepts, finding frequent item sets: Apriori algorithm, generating rules, improved Apriori algorithm, incremental ARM, associative classification, rule mining, classification and prediction, what is classification and prediction? Issues regarding classification and prediction: classification methods: decision tree, Bayesian classification, rule based, CART, neural network, prediction methods: linear and nonlinear regression, logistic regression, introduction of tools such as DB miner /WEKA/DTREG DM tools.

Title	Code	Semester/Duration	Credits
E-COMMERCE	INT327	Longitudinal/6	(2,2,0)3

This course focuses on electronic commerce applications, technologies, and tools which are used to conduct business on the World Wide Web. It reviews foundations of e-commerce, its infrastructure, current business models in business-to-customers (B2C) and business-to-business (B2B) transactions, security and quality assurance, web site design strategies, payment systems, and various issues—Internet marketing, legal, regulatory, technological, social, and ethical--which relate to electronic business, systems development issues, electronic data interchange, web-based marketing, e-supply chains, e-procurement, emarket-place, customer relationship management, and web-enabling mobile. A major part of the course will be devoted to hands-on practices covering client-side (front-end) and server- side (back-end) applications in web-based business information systems. Essentials of contemporary programming tools for e-commerce development such as HTML, XML, ASP (VB/JavaScript), E-Business case studies are used to demonstrate the advantages and the challenges related to integrating ecommerce applications.

Title	Code	Semester/Duration	Credits
INFORMATION SECURITY	INT411	Longitudinal/7	(2,2,0)3

Topics include Foundations: security mindset, essential concepts (policy, CIA, etc), Software security: vulnerabilities and protections, malware, program analysis, practical cryptography: encryption, authentication, hashing, symmetric and asymmetric crypto networks: wired and wireless networks, protocols, attacks and countermeasures, applications and special topics: databases, web apps, privacy and anonymity, voting, public policy.

Title	Code	Semester/Duration	Credits
PARALLEL AND DISTRIBUTED COMPUTING	COM412	Longitudinal/7	(2,2,0)3

PART I: synchronous parallel models and algorithms, overview of parallel models and analysis of parallel algorithms, combinational circuits, parallel computation using circuits. The PRAM model and several PRAM algorithms will be discussed. It consists of: interconnection network models such as linear arrays, 2D meshes, hyper cubes, models using buses, including a re-

configurable mesh and a linear array with optimal buses, the locally developed MSIMD model called MASC, asynchronous Parallel Models including SPMD, BSP and LogP.

PART I I: distributed algorithms, introduction, locality-sensitivity, distributed network models, broadcast, converge cast, downcast, up cast, tree constructions, synchronizers, vertex co-louring, maximal independent sets, message routing, locality-preserving representations, applications of locality-preserving representations.

Title	Code	Semester/Duration	Credits
IT PROJEXT MANAGEMENT	INT413	Longitudinal/7	(2,2,0)3

Introduction to project management concepts, tools, and techniques; project integration management; project planning, scope management, scheduling, budget control, human resource management, communication management, risk analysis and management, project quality management, and procurement management. MS-Project will be demonstrated and used as a tool for creating project management documents.

Title	Code	Semester/Duration	Credits
ARTIFICIAL INTELLIGENCE	COM414	Longitudinal/7	(2,0,3)3

An introduction to the basic principles, techniques, and applications of artificial Intelligence. Coverage includes: knowledge representation, logic, inference, problem solving, search algorithms, game theory, perception, learning, planning, and agent design. Students will experience programming in AI language tools. Potential areas of further exploration include expert systems, neural networks, fuzzy logic, robotics, natural language processing, and computer vision.

Title	Code	Semester/Duration	Credits
SIMULATION AND MODELING	COM415	Longitudinal/7	(2,0,3)3

Introduction: course logistics, definitions of modelling and simulation, when to apply these techniques, applications, terminology and components, discrete vs. continuous time and process flow in simulation study. Simulation examples: queuing systems, communications networks. General principles: Event -driven simulation, World Views, list processing. Simulation software: history, selection process, simulation in high level language (C, C++, Pascal, Fortran), simulation packages (Matlab / Simulink), interpreted vs. compiled simulators, future trends. statistical models: terminology and concepts, useful statistical models, distributions. Queuing models: characteristics, performance measures, steady-state behaviour, networks of queues. Random number generation: properties of random numbers, generation of pseudo-random numbers, testing for randomness, pitfalls.

Title	Code	Semester/Duration	Credits
MOBILE DEVICE PROGRAMMING TECHNOLOGIES	COM421	Longitudinal/8	(2,0,3)3

Introduction to mobile computing, mobile platforms and architectures, mobile Java - J2ME, Android operating system: Its architecture and its programming implementation using Eclipse, JDK and SDK. iOS operating system, Symbian S60 OS-Windows Phone 7, wireless telecommunication, wireless networks, mobile security, mobile databases, mobile multimedia services, emerging mobile technologies.

Title	Code	Semester/Duration	Credits
COMPUTER ETHICS	HMS422	Longitudinal/8	(2,0,0)2

This course introduces students to the topics of information technology ethics including: definitions, rules and policies of computer ethics, hacking, viruses, Internet ethics, freedom of expression on the Internet, computer professionals and social responsibilities, software copyright, intellectual property, software piracy, cyber law and privacy and security of computerized information.Topics: An overview of ethics, ethics for IT workers and IT users, computer and internet crime, privacy, intellectual property, the impact of information technology on productivity and quality of life.

Title	Code	Semester/Duration	Credits
GADUATION PROJECT	COM425	Longitudinal/8	(0,0,18)6

Students will identify an actual computer related business problem and apply research principles and procedures to reach a solution. This includes development of a proposal, problem formulation as well as data collection and analysis culminating in a presentation of all steps used in the research process.

An applied detailed research on a subject in a related field should by conducted by the student as a prerequisite for graduation. Research structure and set up are supposed to strictly follow the scientific research methods and techniques in terms of: Definition of the problem or the subject in details, Definition of solution techniques or analysis methods, Researching and performing practical works, results; reporting: page set up, sentence structure, headings, abbreviation formats, figure and table formats, and table of references format.

ELECTIVE COURSES

Elective courses determine by the Faculty Management according to the strategic plan.

Title	Code	Semester/Duration	Credits
OPEN SOURCE OPERATING SYSTEMS	COM4xx	Longitudinal	(2,0,3)3

Course Outline:

The course covers partitioning of hard-drives, Slackware OS setup, basic linux commands, network connectivity, dual booting w/other O.S., adding packages sets, adding partitions, adding more swap space, opening user accounts, setting up groups, setting permissions on files

and directories, groups and permissions exercise (graded), setting up Telnet server, using SSH, setting up a PROFTPD server, setting up a VSFTPD server, configuring TCP forwarding, starting the Apache web server, default server web site, user's web sites, executing CGI scripts, virtual hosting, protecting directories with hatches, installing Apache from scratch, configuring an SSL server.

Title	Code	Semester/Duration	Credits
KNOWLEDGE MANAGEMENT	COM4xx	Longitudinal	(2,0,3)3

Course Outline: the course covers principles of knowledge management (overview, knowledge management solutions, etc.), knowledge management technologies (artificial intelligence, digital libraries, repositories, etc.), knowledge management systems (knowledge discovery systems, nnowledge capture systems, knowledge sharing systems, knowledge application systems, etc.).

Title	Code	Semester/Duration	Credits
GEMNETIC ALGORITHMS	COM4xx	Longitudinal	(2,0,3)3

Course Outline:

Basic concepts: representation, objective and evaluation functions, local vs global optima traditional methods: hill climbing, simulated annealing, branch and bound evolutionary approaches: Population-based Search: genetic algorithms and evolutionary computation, genetic programming, niching , crowding methods, island models, and co-evolution.

Title	Code	Semester/Duration	Credits
EXPERT SYSTEMS	COM4xx	Longitudinal	(2,0,3)3

Introduction to expert systems, knowledge acquisition, knowledge pepresentation, expert system tools, LISP, CLIPS, expert system implementation, expert system testing.

Title	Code	Semester/Duration	Credits
COMPUTER NETWORK PROGRANNING	COM4xx	Longitudinal	(2,0,3)3

Networking basics, protocol basics, Internet protocols, and socket programming. This is a project-oriented course. Students will be required to design and implement a layered protocol stack.

Title	Code	Semester/Duration	Credits
DICISION SUPPORT SYSTEMS	COM4xx	Longitudinal	(2,0,3)3

Introduction to DSS, expectations and DSS, decision making, exploring the range of DSS research, knowledge management, project proposals, model oriented DSS, visualization-oriented DSS, business intelligence and data warehousing, DSS user interfaces, new trends in DSS.

Title	Code	Semester/Duration	Credits
ADVANCED COMPUTER NEWTWORK MANAGEMENT	COM4xx	Longitudinal	(2,0,3)3

The course covers switching: switch performance measures, time and space switches, modular switch design, packet switch and distributed buffer, optical N/W: DWDM, high-speed networks, IP forwarding architectures, overlay model-CLIP, LANE, RSVP, virtual private networks (VPN), MPLS support for VPN, network management, case study: HP-open view, inter-vehicular communications and GPS, network monitoring and tuning, troubleshooting.

Title	Code	Semester/Duration	Credits
ADVANCED DATABASES	COM4xx	Longitudinal	(2,0,3)3

Introduction, concepts and definitions, normalization techniques, data mining and data warehouse, transaction processing, concurrency control, distributed databases, database security, temporal database.

Title	Code	Semester/Duration	Credits
MODERN TRENDS IN COMPUTER SCIENCE	COM4xx	Longitudinal	(2,0,3)3

The course topics will be tailored according to the emphasis of the course selected.

Title	Code	Semester/Duration	Credits
ADVANCED ALGORITHMS	COM4xx	Longitudinal	(2,0,3)3

combinatorial algorithms (set cover, steiner tree and TSP, multiway cut, knapsack, minimum make span scheduling), LP-Based algorithms (LP Duality, set cover via dual fitting, LP rounding techniques, sparsest cut, facility location, semidefinite programming and max-cut) and other topics including approximation algorithms based on algorithmic game theory, hardness of approximation and open problems.

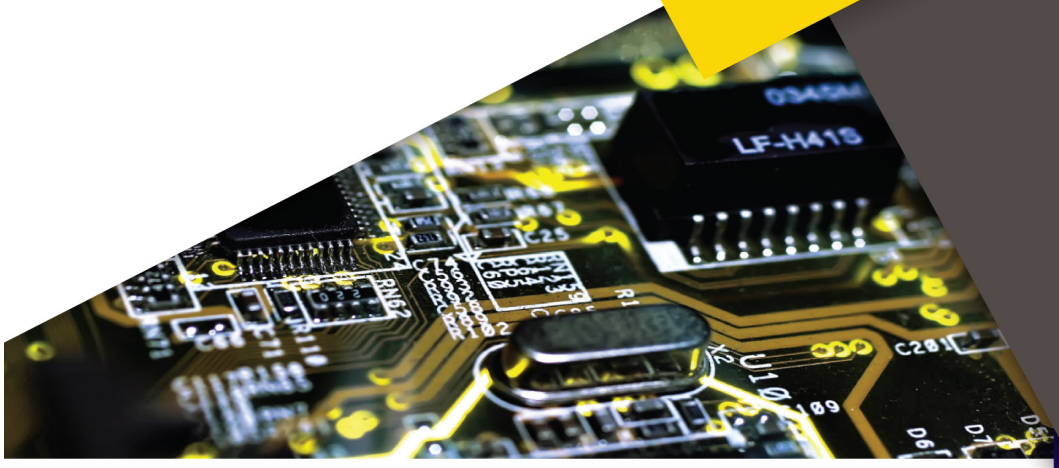
Title	Code	Semester/Duration	Credits
CRYPTOGRAPHY	COM4xx	Longitudinal	(2,0,3)3

Basic security concepts, basic cryptography, hash functions, secret key cryptography, public key cryptography, authentication, trusted intermediaries, real-time communication security, miscellaneous.

FACULTY OF

ENGINEERING

UNDERGRADUATE
& GRADUATE
PROSPECTUS



Civil Engineering
[B.Sc (honours)]

VISION AND MISSION

The VISION of the Civil Engineering Department is to be recognized locally and regionally as a leading department providing high quality education, research and services.

The MISSION is to provide students with the highest level of theoretical and practical education that leads them to successful careers. The department programmes prepare graduates to acquire effective and interactive skills to face new challenges as high caliber Civil Engineers to enable them to contribute effectively and professionally to society.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Engineering, has to:

1. Obtain pass mark in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry, computer or engineering sciences. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.
2. Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.
3. Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Engineering-. Pay the published fees: 30,000 SDG or US $ 3,500 [international students] (2018).

CAREER ADVICE :

Civil Engineering is the oldest and one of the most important branches of engineering profession all over the world as civil engineering is related to almost all aspects of civilization. Many of the important things in our lives that we take for granted are the product of civil engineering. Civil engineer deals with a wide variety of engineering aspects such as designing, construction, and maintenance of different structure (buildings, embankments, storage tanks, dams, roads, water and wastewater networks, irrigation and drainage networks, etc..), solving execution problems, managing engineering and construction projects, and it just does not end there. Civil engineer also has a significant role in planning and managing transportation systems, terrific safety, conservation and development of water resources, treatment and reuse of wastewater, and the list extends. The civil engineering curriculum in National University - Sudan is set to serve the broad range activities of the profession. It is designed to fulfill the student's need of sufficient and balanced content of different civil engineering topics. The graduate can go in any one of the above areas, and be immediately enrolled in jobs. A graduate may, also, choose to obtain masters or PhD in the subspecialties of civil engineering. International students are allowed to take engineering jobs in Sudan.

FACULTY OBJECTIVES

The objectives of the National University Faculty of Engineering -Civil Engineering Department are to:

1. Ensure that graduates will have a mastery of fundamental knowledge, problem solving skills, engineering experimental abilities, and design capabilities necessary for entering civil engineering career and/or higher studies.
2. Produce graduates that have the knowledge and skills necessary for identifying and assessing design alternatives and the related social, economic, environmental, and public safety impacts.
3. Produce graduates who have verbal and written communication skills necessary for successful professional practice.
4. Prepare graduates to function effectively on teams.
5. Prepare graduates to deal with ethical and professional issues, taking into account the broader societal implications of civil engineering.
6. Prepare graduates for professional careers, leadership roles and life-long learning.

Curriculum Objectives [Characteristics of the civil engineering graduate

A graduate of the National University Civil Engineering Curriculum should be able to:

1. Show ability to apply knowledge of mathematics, science, and engineering.
2. Demonstrate the skills to design and conduct experiments, as well as to analyze and interpret data.
3. Show ability to design a system, component, or process to meet desired needs.

4. Present attitudes to function on multi-disciplinary teams.
5. Identify, formulate and solve engineering problems.
6. Show understanding of professional and ethical responsibility.
7. Communicate effectively.
8. Discuss the impact of engineering solutions in a global and societal context.
9. Recognize the need for, and an ability to engage in life-long learning
10. Show awareness of contemporary issues.
11. Use, skillfully the techniques, skills, and modern engineering tools necessary for engineering practice.
12. Plan, design, construct, maintain, and operate of large and permanent engineering projects of our civilization. Civil engineers are in demand wherever there are people.
13. Discuss the major subdivisions of civil engineering, structural, geotechnical, environmental, sanitary, water resources, and transportation engineering.
14. Outline the components of projects as bridges and large buildings, dams, and other river and harbor work, municipal water supply and sanitation facilities, streets, highways, and other transportation facilities.

Feedback to students after mid-course and end of course assessment is an essential part of the civil engineering programme

TIMETABLE

The student has to earn 193 credit hours to obtain a B.Sc. degree in Civil engineering. The study programme for BSc students in the Civil Engineering Department is distributed over 10 semesters as follows:

Semester 1 [24 CHs - 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Arabic Language 1	ARB 111	3			3
2	English Language 1	ENG 111	2			2
3	Islamic Studies 1	IST 111	3			3
4	Int. to Computing	COM 111	1		2	2
5	Calculus 1	MAT 111	2	2		3
6	Physics 1	PHY 111	2	1	2	3
7	Arabic Language 2	ARB 112	3			3
8	English Language 2	ENL 112	2			2
9	Islamic Studies 2	IST 112	3			3
			21	3	4	24

Semester 2 [23 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Linear Algebra	MAT 121	2	2		3
2	General Chemistry	CHM 121	2		3	3
3	Statics	MAT 122	2	2		3
4	Calculus 2	MAT 123	2	2		3
5	Analytic Geometry	MAT 124	2	2		3
6	Physics II	PHY 121	2	1	2	3
7	Engineering Drawing- I	GEN 121	1	3		2
8	Dynamics	MAT 125	2	2		3
			15	14	5	23

Semester 3 [20 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Sudanese Studies	SDS 211	2	-		2
2	English Language 3	ENL 211	2	-		2
3	Int. to Civil Eng.	CEN 211	2	-		2
4	Surveying	CEN 212	2		3	3
5	Eng. Geology	CEN 213	2			2
6	Differential Equations	MAT 211	2	2		3
7	Computer Programming	COM 221	2		2	3
8	Mechanics of Material I	GEN 212	2	2		3
			16	4	5	20

Semester 4 [20 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Numerical Methods	MAT 222	2	2	1	3
2	Vector Analysis	MAT 221	2	2		3
3	Int. to Mechanical Eng	GEN 221	2	1		2
4	Int. to Electrical Eng	GEN 224	2	1	2	3
5	Advance Surveying	CEN 221	2		3	3
6	Civil Eng. Drawing	CEN222	1	3		2
7	Material science	GEN 223	2	-		2
8	Occupational and Environmental Safety	GEN 222	2			2
			15	9	6	20

Semester 5 [19 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Complex Functions	MAT 311	2	2		3
2	Structural Analysis I	CEN 311	2	2		3
3	Fluid Mechanics	CEN 312	2	1	2	3
4	Concrete Technology	CEN 313	2		3	3
5	Construction Eng	CEN 314	2			2
6	Mechanics of Material II	CEN 315	2	2		3
7	Eng. Properties of Soils	CEN 316	2		1	2
			14	7	6	19

Semester 6 [16 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Statistics and Probability	MAT 321	2	2	1	3
2	Remote Sensing & GIS	CEN 321	3		1	3
3	Hydraulics	CEN 322	2	1	2	3
4	Quantity Surveying	CEN 323	2	1		2
5	Reinforced Concrete DesignI	CEN 324	2	2		3
6	Ethics and Profession practice	CEN 325	2			2
			13	6	4	16

Semester 7 [19 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Water Supply Eng.	CEN 411	2	1	2	3
2	Structural Analysis II	CEN 412	3	2		4
3	Hydrology	CEN 413	3	1		3
4	Design of Steel Structures	CEN 414	3	2		4
5	Soil Mechanics	CEN 415	2	1	2	3
6	Engineering Economics	GEN 411	2			2
			15	7	4	19

Semester 8 [19 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Reinforced Concrete Design II	CEN 421	3	2		4
2	Waste Water Eng.	CEN 422	3	1		3
3	Highway & Transportation Eng.	CEN 423	3	1	2	4
4	Groundwater Eng.	CEN 424	2	1		2
5	Structural Analysis III	CEN 425	3	1		3
6	Construction Management	CEN 426	3	1		3
			17	7	2	19

Semester 9 [18 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Foundation Eng	CEN 511	3	1		3
2	Highway construction and Design	CEN 512	3	1		3
3	Dynamics of Structures	CEN 513	3	1		3
4	Hydraulic Structures	CEN 514	3	1		3
5	Elective 1	CEN 55	3	1		3
6	Graduation Project	CEN 590	0	6		3
			15	11	0	18

Semester 10 [14 CHs- 20 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Improvement of Geotechnical Materials	CEN 521	3			3
2	Computer Applications	CEN 522	1		3	2
3	Bridge Design	CEN 523	3	1		3
4	Elective 2	CEN 55	3	1		3
5	Graduation Project	CEN 590	0	6		3
			10	8	3	14

COURSE OUTLINES

Title	Code	Semester/Duration	Credits
PHYSICS-1	PHY 111	1/Longitudinal	2,1,2

Vectors, particle kinematics and dynamics, work, energy, momentum, angular momentum, conservation laws, rigid bodies, oscillations, temperature, properties of matter.Mechanisms of heat transfer, introduction to kinetic theory of matter. Physical optics: theories of light; diffraction of light; polarization; Waves and oscillations.

Title	Code	Semester/Duration	Credits
CALCULUS 1	MAT111	1/Longitudinal	2,2,0

Functions, limits, continuity, differentiation and integration of polynomials, exponential, logarithmic and trigonometric functions, product, quotient and chain rules applications of differentiation to graphing, series, maximum-minimum problems and related rate problems, definite and indefinite integrals, and the fundamental theorem of calculus. Surfaces of revolution, parametric equations, polar coordinates, sequences and series, and Taylor series.

Title	Code	Semester/Duration	Credits
PHYSICS-2	PHY121	2/Longitudinal	3,1,2

Electricity and magnetism: Coulomb's law, Gauss's law and its application, Ohm's law, Kirchoff's law; Faradays law of electromagnetic induction, Modern physics: Galilean transformation, special theory of relativity and its consequences; quantum theory of radiation; photo-electric effect, Compton effect, wave particle duality, interpretation of Bohr's postulates, radioactive disintegration, properties of nucleus, nuclear reactions, fission, fusion, chain reaction, nuclear reactor.

Title	Code	Semester/Duration	Credits
GENERAL CHEMISTRY	CHM 121	2/Longitudinal	2,0,3

Atomic law, quantum mechanics and Bohor hydrogen atom, wave mechanics atomic model, periodic table, periodic properties of elements and its relation to electronic structure, chemical and physical bonding: types and properties, electronic bonding and particle structure, bonding forces; Spectroscopy.

Title	Code	Semester/Duration	Credits
Linear Algebra	MAT 121	2/Longitudinal	2,2,0

Geometric vectors in three dimensions, dot product, cross product, lines and planes, complex numbers, systems of linear equations, existence and nonexistence of solutions, matrix algebra: matrix inverse, determinants, Cramer's rule, introduction to vector spaces, linear indepen-

dence and bases, rank, linear transformations, matrix- matrix Transformation: rotation of sxes, orthogonality and applications, Gram-Schmidt algorithm, Eigen values and eigenvectors.

Title	Code	Semester/Duration	Credits
Calculus2	MAT 123	2/Longitudinal	2,2,0

Applications of integration including areas, volumes, moments, pressure and work, techniques of integration, length of curves, surfaces of revolution, parametric equations, functions of several variables, partial derivatives, implicit functions, multiple integrals, line, surface, and volume integrals, change of variables in multiple integrals.Polar coordinates: polar curves, standard polar curves

Title	Code	Semester/Duration	Credits
Analytic Geometry	MAT 124	2/Longitudinal	2,2,0

Introduction Coordinates. Vector form of a straight line, parametric equations of a straight line, Planes: Equation of a plane, Cylindrical and spherical coordinate: Introduction to cylindrical and spherical Coordinates, Surfaces: Quadratic surfaces, Cylinder and cone: Cylinder, directrix of cylinder, right cylinder, The conic sections, General equation of sphere, great circle.

Title	Code	Semester/Duration	Credits
Statics	MAT 122	2/Longitudinal	2,2,0

Vector operations.Equilibrium of a particle. Free body diagram. Moment of forces about a point and about an axis.Equivalent systems.Equilibrium of a rigid body in two dimensions. Trusses (method of Joints and sections).Bullys. Friction.

Title	Code	Semester/Duration	Credits
Dynamics	MAT 125	2/Longitudinal	2,2,0

Displacement, velocity and acceleration (and their angular counterparts) - basic dynamics concepts - force, momentum, work and energy - Newton's laws of motion - basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle.

Title	Code	Semester/Duration	Credits
DIFFERENTIAL EQUATIONS	MAT 211	3/Longitudinal	2,2,0

Ordinary differential equation: formation of differential equations; solution of first order differential equations by various methods; solution of differential equation of first order but higher degrees; solution of general linear equations of second and higher orders with constant co-efficient; solution of Euler's homogeneous linear differential equations.

Partial differential equation: introduction, linear and non-linear first order differential equations; standard forms; linear equations of higher order; equations of the second order with variable coefficients.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO CIVIL ENGINEERING	CEN 211	3/Longitudinal	2,0,0

Civil engineering profession. Civil engineering disciplines. Infrastructures. Building Constructions and management. Remote sensing & GIS. Environmental Engineering. Road Engineering. Bridges. Dams and Irrigation. Site visits.

Title	Code	Semester/Duration	Credits
MECHANICS OF MATERIALI	GEN 213	3/Longitudinal	2,2,0

Concepts of stress and strain, constitutive relationships; deformations due to tension, compression and temperature change; beam statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams using method of section and summation approach; elastic analysis of circular shafts, solid noncircular and thin walled tubular members subjected to torsion; flexural and shear stresses in beams; shear centre; thin walled pressure vessels. Tension, direct shear and impact tests of mild steel specimen.

Title	Code	Semester/Duration	Credits
ENGINNERING DRAWING	GEN211	3/Longitudinal	1,3,0

Lines and lettering; plane geometry: drawing of linear and curved geometric figures, e.g. pentagon, hexagon, octagon, ellipse, parabola, hyperbola; solid geometry: concept of isometric view and oblique view, theory of projections; drawing of isometric view of 3d objects such as cube, prism, pyramid, cone and cylinder; projections of cube, prism, cone, cylinder; developments.

Title	Code	Semester/Duration	Credits
COMPUTER PROGRAMMING	COM 221		2,0,2

Computer organization and hierarchy of programming language, high-level language, arithmetic computations, algorithm design Flowcharts, selection statements, repetition statements, debugging and testing of programmed, logical and character data type, data files and formatted outputs, array processing, Applications.

Title	Code	Semester/Duration	Credits
ENGINEERING GEOLOGY	CEN 213	3/Longitudinal	2,0,0

Introduction. Process of external and internal origin (Volcanic, Metamorphic, Sedimentary), Physical properties and identification of common rock forming minerals, Weathering and Erosion, Discontinuity classification: Joints, faults and other fractures, Folds, unconformities.

Brief Introduction to structural Geology: Seismic Waves, Classification of Earthquakes, Earthquake Geology of Aquifers, Wells, Springs and Ground Water Conditions, Role of geology in selection of sites for civil engineering structures, Brief introduction of local geology.

Title	Code	Semester/Duration	Credits
SURVEYING	CEN 212	3/Longitudinal	2,0,3

Distance measurement techniques, Leveling and Contouring: Reduction of levels, adjustments of levels, precise leveling. Theodolite and its Types, Traversing and Triangulation, Tachometry, Plane Table Surveying. Horizontal control techniques, Survey markers, Observations on Polaris, Computation technique for azimuth determination and Gyro-theodolite. Total Stations.

Title	Code	Semester/Duration	Credits
NUMERICAL METHODS	MAT221	4/Longitudinal	2,2,0

Errors and Approximation. Bisection method, Newton's method, Secant method, Method of false position. Newton's and Gauss interpolating techniques, Simple theorems on divided differences, Lagrange's formula of interpolation, Numerical differentiation. Numerical Integration: Trapezoidal and Simson's rule numerical integration techniques. Solution of differential equations, Euler and modified Euler methods, RungeKutta and KuttaMerson methods.

Title	Code	Semester/Duration	Credits
VECTOR ANALYSIS	MAT 222	4/Longitudinal	2,2,0

Vectors: addition, subtraction, multiplications, vectors products. space curves, arc length, curvature, scalar and vector fields, gradient, divergence and curl. Theorem: the divergence Theorem, Green's theorem in a Plane, Stokes' theorem. Derivation of Gauss's Law, the Heat equation and Navier-Stokes equations.

Title	Code	Semester/Duration	Credits
CIVIL ENGINEERING DRAWING	CEN 221	4/Longitudinal	1,3,0

An introduction in graphical engineering which cover graphical technique and technical drawing principle in order preparing civil engineering drawing. Computer usage in drawing and detailing, Basic CAD practices, Basic AutoCAD usage.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO MECHNICAL ENGINEERING	GEN 221	4/Longitudinal	2,1,2

Basic Concepts: Fundamentals of Heat Transfer, Conduction, Convection, Radiation, Thermal Conductivity, Overall Heat Transfer Coefficients, Practical Equations, Laws of Thermodynamics, Internal Combustion Engines.

Heating Ventilation and Air Conditioning (HVAC): Introduction to HVAC components. Heating and cooling load and its calculations; Comfort charts; Outline of A.C. systems; Consideration for air-conditioning in buildings; natural Ventilations; Insulating materials.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO ELECTRICAL ENGINEERING	GEN 222	4/Longitudinal	2,1,2

Electrical Elements and Circuits: Electric current, voltage, power and energy, Ohm's law, inductance, capacitance, Kirchoff's laws. Introduction to node voltage and loop current methods, AC single and poly-phase system, DC machines, AC Synchronous Machines, AC Induction Machines, Transformers, Converting Machines. Power Plant Installations and Distribution System: Power Systems layout, generation, transmission, distribution and utilization of electric power, Introduction to domestic electrification. Electronics: Diode. Transistor and simple rectifier circuit. Principles of House wiring and Industrial wiring, Illumination. Electrical know how related to experimental design instrumentations like corrosion rate measurements, strain guages, LDT's, LVDT's. etc.

Title	Code	Semester/Duration	Credits
Material Science	GEN 223	4/Longitudinal	2,0,0

Classification of materials. Atomic structure: atomic structure and Inter-atomic bonding., ceramics and polymers. Imperfections in solids. Mechanical properties of materials: Response to Stress, Shear and Torsion. Phase diagrams and transformation in metals. Metal Alloys, Ceramics, and Polymers. Corrosion and degradation of materials.Electrical, Optical,thermal and magnetic properties: Material selection and design considerations. Economical, environmental and social issues in materials science.

Title	Code	Semester/Duration	Credits
Occupational and Environmental Safety	GEN 224	4/Longitudinal	2,0,0

Methods of toxicology and risk assessment of workplace, hazards, contemporary issues on chemical hazards in the workplace, physical hazards in the workplace, ergonomics, occupational epidemiology, and national, regional and international guidelines, standards and regulations.

Environmental hazards, indoor air quality, ambient air quality, water pollution, solid waste disposal and mining pollution, environmental noise, environmental auditing and impact assessments.

Title	Code	Semester/Duration	Credits
Advanced Surveying	CEN 221	4/Longitudinal	2,0,3

Control Surveys: Geodesy, Coordinate Systems and Datum, Modern Methods in Surveying. Computation of areas by various methods, Computation of and volumes by various methods. Height of points from a Digital Terrain Model. Mass-Hall Diagram. Horizontal and vertical curves.

Title	Code	Semester/Duration	Credits
STRUCTURAL ANALYSIS-I	CEN 311	5/Longitudinal	2,2,0

Basic principles. Analysis of statically determinate trusses, beams, frames, arches, suspension cables. Influence lines for statically determinate structures. Deflection of structures. Buckling of columns.

Title	Code	Semester/Duration	Credits
ENGINEERING PROPERTIES OF SOIL & MEASUREMENTS	CEN 316	5/Longitudinal	2,0,1

Laboratory Measurements of: Moisture density relationship, Classification and identification of soil, Grain size analysis, Compaction characteristics, Permeability, Consolidation, Shear strength. Associated laboratory experiments.

Title	Code	Semester/Duration	Credits
CONSTRUCTION ENGINEERING	CEN 314	5/Longitudinal	2,0,0

General, Construction Environment. Site work, construction equipment, Substructure, Superstructure, Internal Construction and finishing, Domestic Services.

Title	Code	Semester/Duration	Credits
CONCRETE TECHNOLOGY	CEN 313	5/Longitudinal	2,0,3

Introduction to concrete; component materials for concrete (cement, aggregates, water, chemical admixtures, mineral admixtures); properties of materials, tests on materials; production processes of concrete, tests on fresh concrete; concrete mix design; tests on hardened concrete, properties of hardened concrete, strength, deformation, durability.

Title	Code	Semester/Duration	Credits
FLUID MECHANICS	CEN 312	5/Longitudinal	2,1,2

Introduction to fluid properties and characteristics, static fluid, fluid kinematics, continuity equation, momentum equation and, Bernoulli and energy equation, flow measurement, boundary layers, lift and drag forces. Related laboratory experiments.

Title	Code	Semester/Duration	Credits
MECHANICS OF MATERIAL II	CEN 315	5/Longitudinal	2,2,0

Symmetric and unsymmetric bending of beams; stress transformation, failure criteria; beam deflection by direct integration and moment area method; buckling of columns; elastic strain energy and external work; cable and cable supported structures; bolted, riveted and welded joints.

Title	Code	Semester/Duration	Credits
REINFORCED CONCRETE DESIGNI	CEN 324	6/Longitudinal	2,2,0

Introduction to properties of concrete and reinforcing steel. Behaviour of reinforced concrete under flexure and shear. Introduction to Code of Design. Types of loads and their factors. Ultimate strength method of design. Analysis and design of singly and doubly reinforced sections. Analysis and design of T-section. Design of beams against shear forces. Design of one-way slab and stairways. Development length.Design of isolated, combined and wall footings.

Title	Code	Semester/Duration	Credits
HYDRAULICS	CEN 322	6/Longitudinal	2,1,2

Pipe flow analysis and design. Steady flow in closed conduits and networks. Steady uniform flow in open channels. Non-uniform flows in open channels. Flow measurements. Hydraulic machinery (Pumps and Turbines), Related laboratory experiments.

Title	Code	Semester/Duration	Credits
Statistics and Probability	MAT 322	6/Longitudinal	2,2,0

measures of central tendency and standard deviation; moments, skewness and kurtosis; elementary probability theory and discontinuous probability distribution; continuous probability distributions, e.g. normal and exponential distribution.

Title	Code	Semester/Duration	Credits
REMOTE SENSING AND GIS	CEN 321	6/Longitudinal	3,0,1

Introduction to the basic for GPS and GIS applications; Geodesy: introduction, the ellipsoid and geoids, geodetic position, geoids undulation,deflection of the vertical, geodetic coordinate system ; Map Projection : projections used in state plane coordinate systems, UTM projection; GPS : overview of GPS, differential GPS, GPS static survey, GPS kinematic survey; GIS: introduction to GIS, GIS data sources and data format, creating GIS databases, GIS applications, use of surveying software such as GeoMedia and Leica Geo Office).

Title	Code	Semester/Duration	Credits
QUANTITY SURVEYING	CEN 323	6/Longitudinal	2,1,0

Specification of construction items. Bill of Quantities (B.O.Q) & Measurement Book (M.B): Types and methods of estimates, Working out quantities, rates and cost. schedule of rates and specifications; Rate analysis;

Title	Code	Semester/Duration	Credits
STRUCTURAL ANALYSISII	CEN 412	7/Longitudinal	3,2,0

Analysis of statically indeterminate structures by method of consistent deformations. Method of slope-deflection and moment distribution. Influence lines for statically indeterminate structures. Approximate methods of analyze of multi-sections forms.

Title	Code	Semester/Duration	Credits
Ethics and Profession Practice	CEN 427	7/Longitudinal	3,2,0

Engineering ethics: meaning of ethics, importance of ethics, principles of ethics, required ethical behaviour, code of engineering ethics, responsibilities of professional engineer, professional behaviour. Basics of law for engineers: introduction to Sudanese legal system, law of contract, industrial law, intellectual property law.etc.

Title	Code	Semester/Duration	Credits
SOIL MECHANICS	CEN 415	7/Longitudinal	2,1,2

Seepage theory, soil stresses using elastic theory, Immediate settlement, Total and effective stress principle, consolidation settlement and its rate, Shear strength, Lateral earth pressure, Slope stability, Excavation and bracing.. Associated laboratory experiments.

Title	Code	Semester/Duration	Credits
ENGINEERING ECONOMICS	GEN 411	7/Longitudinal	2,0,0

Economics and engineering; microeconomics and macroeconomics; theory of demand and supply and their elasticity; demand estimation; price determination;, depreciation; Time value of money; cost-benefit analysis; pay-back period, NPV, IRR, inflation; economic feasibility of engineering undertakings.

Title	Code	Semester/Duration	Credits
HYDROLOGY	CEN 413	7/Longitudinal	3,1,0

Principles of Hydrology and Water Resources Engineering. Hydrologic cycle. Measurement of precipitation, evaporation, infiltration and stream flows. Hydrographs. Flood Routing. Reservoir Sedimentation.

Title	Code	Semester/Duration	Credits
DESIGN OF STEEL STRUCTURES	CEN 414	7/Longitudinal	3,2,0

Design of steel structures. Material properties of steel. Allowable stress design approach. Introduction to codes. Connections, tension members, compression members, beam-columns. Beams and girders. Design of frames, trusses and industrial buildings.

Title	Code	Semester/Duration	Credits
Water Supply Engineering	CEN 411	7/Longitudinal	2,2,0

Sources of water and demand requirements, Water quality parameters, Water treatment operations, Water distribution networks, Laboratory Experiments.

Title	Code	Semester/Duration	Credits
REINFORCED CONCRETE DESIGN-II	CEN 421	8/Longitudinal	3,2,0

Review ACI/Euro- Code provisions. Design of Continuous Beams and Frames: Continuity of reinforced concrete structures, load combinations. Design of Two-way slabs: Edge supported vs. column supported slab systems. Design of rectangular and circular Reinforced Concrete Columns. Axially and eccentrically loaded columns.interaction diagrams. Slender columns and biaxial bending.

Title	Code	Semester/Duration	Credits
TRANSPORTATION ENGINEERING	CEN 423	8/Longitudinal	3,1,2

Transportation as a system; human and vehicle characteristics; traffic flow characteristics; highway capacity analysis; highway control devices; public transportation; urban transportation planning; parking facilities; transportation safety; intelligent transportation system and computer applications; introduction to railway, waterway, airport and pipeline.

Title	Code	Semester/Duration	Credits
WASTEWATER ENGINEERING	CEN 422	8/Longitudinal	3,1,0

Composition of sewage and solid wastes, characterization of sewage, B.O.D. Removal kinetic, Sanitation in developing countries, Wastewater collection: Sanitary sewers systems, Storm water collection, Preliminary, primary and secondary treatment, tertiary & advanced treatment, sludge management and waste stabilization ponds system, Introduction to industrial wastes.

Title	Code	Semester/Duration	Credits
STRUCTURAL ANALYSIS III	CEN 425	8/Longitudinal	3,1,0

Energy methods.Matrix method of structural analysis.Flexibility and stiffness methods.Elastic instability. Limit state analysis of frames.

Title	Code	Semester/Duration	Credits
GROUND WATER ENGINEERING	CEN 424	8/Longitudinal	2,1,0

Groundwater in hydrologic cycle and its occurrence. Physical properties and principles of groundwater movement. Groundwater and well hydraulics. Groundwater resource evaluation. Groundwater levels and environmental influences. Water mining and land subsidence.

Groundwater pollution and contaminant transport. Recharge of groundwater. Saline water intrusion in aquifers. Groundwater management.

Title	Code	Semester/Duration	Credits
CONSTRUCTION MANAGEMENT	CEN 426	8/Longitudinal	3,1,0

Construction planning, scheduling, and control. Use of computer-based information systems for project management. Value engineering. Critical path method and PERT scheduling techniques. Computer drawn scheduling networks. Schedule compression. Resource allocation leveling and optimization. Project organization and financial control. Decision making.

Title	Code	Semester/Duration	Credits
FOUNDATION ENGINEERING	CEN 511	8/Longitudinal	3,1,0

Application of soil mechanics and other related techniques to design of foundations. Methods of site and soil exploration; bearing capacity and settlements; shallow and deep foundations; bracing and retaining structures. Case studies.

Title	Code	Semester/Duration	Credits
HIGHWAY DESIGN AND CONSTRUCTION	CEN 512	9/Longitudinal	3,1,0

Characteristics of driver, pedestrian vehicle, and traffic flow affecting highway design; Geometric design of highways; Layouts of intersections, interchanges and terminals; Highway drainage; Review of highway paving materials; Design of asphalt paving mixtures; Pavement design; Highway construction and supervision; categorization of common pavement surface distress and associated correction activities; Introduction to maintenance management system;

Characteristics of driver, pedestrian vehicle, and traffic flow affecting highway design; Geometric design of highways

Title	Code	Semester/Duration	Credits
DYNAMICS OF STRUCTURE	CEN 513	9/Longitudinal	3,1,0

Single degree of freedom system, formulation of equation of motion; free vibration response; response to harmonic, impulse and general dynamic loading; vibration analysis by Rayleigh's method; response spectra; two degrees of freedom system.

Title	Code	Semester/Duration	Credits
HYDRAULIC STRUCTURES	CEN 514	9/Longitudinal	3,1,0

Types and functions of hydraulic structures. Gravity Dams. Earth dams. Over weirs and spillways. Energy dissipation hydraulic structures. Hydropower Plants. Hydraulic design of culverts.

Title	Code	Semester/Duration	Credits
ELECTIVE I: FROM CE DEPARTMENT	CEN 55-	Longitudinal/9	3,1,0

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT I	CEN 590	9/Longitudinal	0,3,0

This is the first phase of the capstone project that is a continual project over two semesters, and involves number of students working as one team tackling different aspects of the civil engineering works, which may involve research and development work, engineering design, literature survey, experimental work, theoretical work, computational studies, simulation, and implementation. Students will be assigned an research and development project, and all work conducted during the semester must be compiled in a final report and orally presented to the examining committee at the end of Semester 2.

Title	Code	Semester/Duration	Credits
IMPROVEMENT OF GEOTECHNICAL MATERIALS	CEN 521	10/Longitudinal	3,0,0

Improving performance of soils for engineering applications. Analysis of methods of stabilizing soils and rocks including topics on: Mechanical and chemical stabilization and earth reinforcement. Site Reports.

Title	Code	Semester/Duration	Credits
COMPUTER APPLICATIONS	CEN 522	10/Longitudinal	1,0,3

Computers in Engineering. Computer programming methods. Matrix algebra language and co aided design of slabs beams and columns.

Title	Code	Semester/Duration	Credits
BRIDGE DESIGN	CEN 523	10/Longitudinal	3,1,0

Superstructure and substructure design. Design of simple span and continuous span bridges, including slab, beam and truss types. Introduction to orthotropic steel plate deck bridges.Suspension bridges.

Title	Code	Semester/Duration	Credits
ELECTIVE II: FROM CE DEPARTMENT	CEN 55-	10/Longitudinal	3,1,0

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT-II	CEN 590	10/Longitudinal	0,3,0

This is the implementation phase of the capstone project that is a continual project over two semesters, and involves number of students working as one team tackling different aspects of the civil engineering works, which may involve research and development work, engineering design, literature survey, experimental work, theoretical work, computational studies, simulation, and implementation. Students will be assigned an research and development project, and all work conducted during the semester must be compiled in a final report and orally presented to the examining committee at the end of the Semister

List of Elective Courses

Title	Code	Semester/Duration	Credits
Introduction to Finite Element Methods	CEN 551	10/Longitudinal	3,1,0

Principles of Finite Element Method of analysis.Definitions and mathematical analysis. Application of principles of Finite Element Methods to the design and analysis of civil engineering structures.

Title	Code	Semester/Duration	Credits
Plastic Analysis	CEN 552	10/Longitudinal	3,1,0

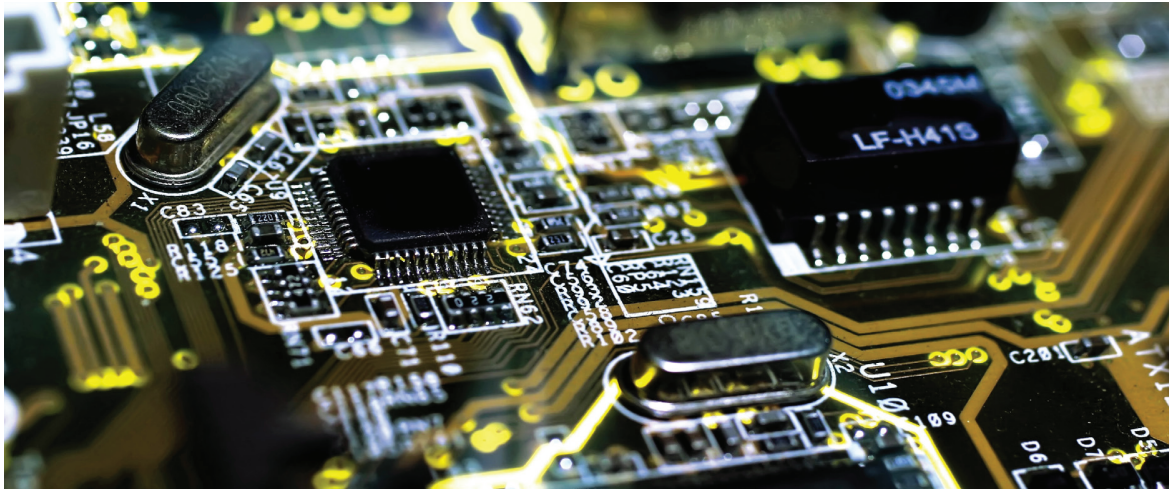
Yield line theory of slabs, yield line, virtual work criterion, application to slabs of different geometry and support condition. Plastic analysis of beams and frames, upper and lower bound theory.Mechanism and static method of analysis.Instantaneous centric plastic moment distribution. Application to beams frames.

Title	Code	Semester/Duration	Credits
Irrigation Engineering	CEN 553	10/Longitudinal	3,1,0

Soil-water relationship as related to application to irrigation water, Irrigation scheduling forcrops, Operation of irrigation projects, Design of canals and drains, Irrigation methods, Layout of canalization and drainage systems for agricultural schemes.

Title	Code	Semester/Duration	Credits
Pavement Design	CEN 554	10/Longitudinal	3,1,0

Road pavement: flexible & rigid pavement, Pavement structural design, Pavement materials & testing: granular materials, bituminous materials & Asphalt Concrete Mixture, Pavement Construction: construction equipment & construction stages, Highway drainage, Highway maintenance



Electrical &Electronic Engineering

[B. Sc (honours in Power, Communication & network, control)]

VISION AND MISSION

The VISION of this Department is to provide education leading to becoming a highly competent professional in Electrical & Electronics Engineering who will excel in meeting the challenges to serve the society.

The MISSION is to enhance the position of the EEE Department as one of the top teaching and research departments in Sudan by providing the highest quality teaching and learning environment for the students and thus producing competent and compassionate EEE graduates fully equipped to achieve the highest personal and professional standards for the overall development of the university and of the country. Moreover, the Department is dedicated to attracting and sustaining a cluster of faculty members who are, through their quality teaching, research and service, devoted to the development of compassionate EEE graduates.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Engineering, has to:

1. Obtain pass mark in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry, and computer or engineering sciences. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.
2. Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.
3. Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and

pass the health examination, aptitude tests and interview at the Faculty of Engineering-.

4. Pay the published fees: 30,000 SDG or US $ 3,500 [international students] (2018).

CAREER ADVICE

Graduate from the Faculty of Engineering with B.Sc (EEE) acquires a unique mix of electrical, electronics and computer related courses enabling the students to take-up a professional career / higher studies in any of these areas. Broad range of topics covered includes Electrical Circuits, Electrical Machines, Control Systems, Measurements & Instrumentation, Power Generation, Distribution & Transmission, Analog &Digital System Design, Power Electronics, Microprocessors, Computer Architecture, Data Structures, Digital Signal Processing, Communication Systems, Renewable Energy Systems and Illumination Technology etc. The curriculum will be updated periodically to reflect changes in the Electrical & Electronic Engineering profession in consultation with experts from industries and other renowned academic institutions. The graduate can go in any one of the above areas, and be immediately enrolled in jobs. A graduate may choose to obtain masters or PhD in the subspecialties of civil engineering. International students are allowed to take engineering jobs in Sudan

FACULTY OBJECTIVES

The objectives of the National University Faculty of Engineering - Electric and Electronic Department are to:

1. Ensure that graduates will have a mastery of fundamental knowledge, problem solving skills, engineering experimental abilities, and design capabilities necessary for entering EE engineering career and/or higher studies.
2. Produce graduates that have the knowledge and skills necessary for identifying and assessing design alternatives and the related social, economic, environmental, and public safety impacts.
3. Produce graduates who have verbal and written communication skills necessary for successful professional practice.
4. Prepare graduates to function effectively on teams.
5. Prepare graduates to deal with ethical and professional issues, taking into account the broader societal implications of Electric and Electronic engineering.
6. Prepare graduates for professional careers, leadership roles and life-long learning.

Curriculum Objectives [Characteristics of the Electrical and Electronic engineering graduate A graduate of the National University- EEE Curriculum should be able to:

1. Show ability to apply knowledge of mathematics and science fundamentals in EE engineering.
2. Act as competent professional with good communication skills and a desire with good knowledge in Electrical & Electronics Engineering.
3. Demonstrate the skills to design and conduct experiments, as well as to analyze and interpret data.
4. Show ability to design a system, component, or process to meet desired needs.

5. Present attitudes to function on multi-disciplinary teams.
6. Identify, formulate and solve engineering problems.
7. Show understanding of professional and ethical responsibility.
8. Communicate effectively.
9. Discuss the impact of EE engineering solutions in a global and societal context.
10. Recognize the need for, and an ability to engage in life-long learning
11. Show awareness of contemporary issues.
12. Use, skillfully the techniques, skills, and modern engineering tools necessary for EE engineering practice.
13. Plan, design, construct, maintain, and operate of large and permanent engineering projects of our civilization
14. Design, develop, test, and supervise the manufacturing of electrical equipment, such as electric motors, radar and navigation systems, communications systems, and power generation equipment.
15. Design and develop electronic equipment, such as broadcast and communications systems from portable music players to global positioning systems (GPS).
16. Engage in postgraduate studies and research to contribute to knowledge expansion.

Feedback to students after mid-course and end of course assessment is an essential part of the electrical and electronic engineering programme

TIMETABLE

The student has to earn 183 credit hours to obtain a B.Sc. degree in Electrical & Electronic Engineering e. The study programme for BSc students in the Electrical & Electronic Engineering Department is distributed over 10 semesters as follows:

Semester 1 [24 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Arabic Language - I	ARL111	3	-	-	3	3
2	English Language - 1	ENL111	2	-	-	2	2
3	Islamic Studies 1	IST111	3	-	-	3	3
4	Introduction to Computing	COM111	1	-	2	3	2
5	Calculus - 1	MAT111	2	2	-	4	3
6	Physics 1	PHY111	2	1	2	5	3
7	Arabic Language - 2	ARL112	3	-		3	3
8	English Language - 2	ENL112	2			2	2
9	Islamic Studies 2	IST112	3			3	3
			21	3	4	28	24

Semester 2 [23 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Linear Algebra	MAT121	2	2		4	3
2	General Chemistry	CHM121	2		3	5	3
3	Statics	MAT122	2	2		4	3
4	Calculus - 2	MAT123	2	2	-	4	3
5	Analytic Geometry	MAT124	2	2		4	3
6	Physics 2	PHY121	2	1	2	5	3
7	Engineering Drawing- I	GEN121	1	3		4	2
8	Dynamics	MAT125	2	2		4	3
			15	14	5	34	23

Semester 3 [21 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Sudanese Studies	SDS 211	2			2	2
2	English Language - 3	ENL211	2	-	-	2	2
3	Complex Functions	MAT212	2	2		4	3
4	Differential Equations	MAT211	2	2		4	3
5	Material Science & Characteristics	GEN211	2	1		3	2
6	Engineering Drawing -2	GEN213	1	3		4	2
7	Mechanical Engineering Principles	GEN212	2	1		3	2
8	Structural Programming	COM211	1	-	3	4	2
9	Electrical Circuits Principles	EEE211	2	1	2	5	3
			14	10	5	29	21

Semester 4 [19 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Vector Analysis	MAT221	2	2		4	3
2	Data Structures and Algorithms	COM221	1		3	4	2
3	Mechanics of Materials	GEN221	2	2	1	5	3
4	Occupational and Environmental Safety	GEN222	2			2	2
5	Electrical Circuits Theory	EEE221	2	1	2	5	3
6	Digital Electronics Systems	EEE222	2	1	2	5	3
7	Analog Electronics Fundamentals	EEE223	2	1	2	5	3
			13	7	10	30	19

Semester 5 [18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Communication Skills	CSK311	2			2	2
2	Statistics and Probability	MAT311	2	2		4	3
3	Digital Electronics Design	EEE311	2		2	4	3
4	Electrical & Electronic Drawing	EEE312	1	2		3	2
5	Electrical Circuits Analysis	EEE313	2	1	2	5	3
6	Measurements& Instrumentations	EEE314	2	1	2	5	3
7	Communications Principles	EEE315	2	1	2	5	3
			13	7	8	28	19

Semester 6 (Control & Power) [18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Numerical Methods	MAT321	2	2		4	3
2	Computer Aided Design	COM321	1		3	4	2
3	Analog Electronics Circuits	EEE321	2	1	2	5	3
4	Control Theory	EEE322	2	2		4	3
5	Electromagnetic Fields Theory	EEE323	2	2		4	3
6	Elements of Power Systems	CPE321	2	2		4	3
7	Electromechanical Conversion	CPE322	2	1	2	5	3
			13	10	7	30	20

Semester 6 (Communications & Networks) [18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Numerical Methods	MAT321	2	2		4	3
2	Computer Aided Design	COM321	1		3	4	2
3	Analog Electronics Circuits	EEE321	2	1	2	5	3
4	Control Theory	EEE322	2	2		4	3
5	Electromagnetic Fields Theory	EEE323	2	2		4	3
6	Objected Oriented Programming	CNE321	2	1	2	5	3
7	Digital Communications	CNE322	2	1	2	5	3

Semester 7(Control)[20 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Engineering Economics	GEN411	2		-	2	2
2	Sensors & Transducers	EEE411	2	1	2	5	3
3	Microprocessors & Applications	EEE412	2	1	2	5	3
4	Electrical Power Utilization	CPE411	2	2	-	4	3
5	Optimization Techniques	CPE412	2	2		4	3
6	Electrical Machines	CPE413	2	1	2	5	3
7	Signals & Systems Analysis	CCN411	2	2		4	3
			14	9	6	29	20

Semester 7(Power) [20CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Engineering Economics	GEN411	2		-	2	2
2	Sensors & Transducers	EEE411	2	1	2	5	3
3	Microprocessors & Applications	EEE412	2	1	2	5	3
4	Electrical Power Utilization	CPE411	2	2	-	4	3
5	Optimization Techniques	CPE412	2	2		4	3
6	Electrical Machines	CPE413	2	1	2	5	3
7	Electrical Power Systems	PRE411	2	2	-	4	3
			14	9	6	29	20

Semester 7 (Communication & Networks)[20 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Engineering Economics	GEN411	2		-	2	2
2	Sensors & Transducers	EEE411	2	1	2	5	3
3	Microprocessors & Applications	EEE412	2	1	2	5	3
4	Computer Networks	CNE411	2	1	2	5	3
5	Antennas Systems	CPE412	2	1	2	5	3
6	Software Engineering	CNE413	2	1	2	5	3
7	Signals & System Analysis	CCN411	2	2		4	3
			14	7	10	31	20

Semester 8 (Control) [19 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Engineering Project Management	GEN421	2			2	2
2	Research Methodology	GEN422	2		-	2	2
3	Power Electronics	CPE421	2	1	2	5	3
4	Digital Signal Processing	CCN421	2	2		4	3
5	Industrial Control Systems	CPE422	2		2	4	3
6	Control Systems	COE421	2	1	2	5	3
7	Instruments Systems & Signals	COE422	2	2		4	3
			14	6	6	29	19

Semester 8 (Power) [19 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Engineering Project Management	GEN421	2			2	2
2	Research Methodology	GEN422	2		-	2	2
3	Power Electronics	CPE421	2	1	2	5	3
4	Industrial Control Systems	CPE422	2		2	4	3
5	Thermodynamics	PRE421	2	2		4	3
6	Power Plants Engineering	PRE422	2	1	2	5	3
7	Power Systems Analysis 1	PRE423	2	2		4	3
			14	6	6	26	19

Semester 8 (Communication & Networks)[18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Engineering Project Management	GEN421	2			2	2
2	Research Methodology	GEN422	2		-	2	2
3	Digital Signal Processing	CCN421	2	2		4	3
4	Computer Networks Engineering	CNE421	2	1	2	5	3
5	Satellite Communications	CNE422	2		2	4	3
6	Multimedia Technology	CNE423	2	1	2	5	3
7	Information Theory & Coding	CNE424	2			2	2
			14	4	6	24	18

Semester 9 (Control)[18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Values & Ethics in Profession	GEN511	2			2	2
2	Artificial Neural Networks	CCN511	2	2		4	3
3	Multivariable Control Systems	COE511	2	2		4	3
4	Optimal Control Theory	COE512	2	2		4	3
5	Control Systems Analysis 1	COE513	1		3	4	2
6	Graduation Project- 1	COE514			6	6	2
7	Elective Course	COE515	2	2		4	3
			11	8	9	28	18

Semester 9(Power)[18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Values & Ethics in Profession	GEN511	2	-		2	2
2	Power Systems Protection	PRE511	2	1	2	5	3
3	Electrical Machines Dynamics	PRE512	2	2		4	3
4	Power System Planning	PRE513	2	2		4	3
5	Power System Analysis 2	PRE514	1		3	4	2
7	Graduation Project- 1	PRE515			6	6	2
8	Elective Course	PRE516	2	2		4	3
			11	7	11	29	18

Semester 9 (Communication & Networks)[18 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Values & Ethics in Profession	GEN511	2			2	2
2	Artificial Neural Networks	CCN511	2	2		4	3
3	Optical Fiber Communications	CNE511	2	1	2	5	3
4	Celluar& Mobile Communications	CNE512	2	1	2	5	3
5	Networks Security	CNE513	2	1		3	2
6	Graduation Project- 1	CNE514			6	6	2
7	Elective Course	CNE515	2	2		4	3
			12	7	10	29	18

Semester 10 (Control)[16 CHs- 20 weeks]

	Title	Code	ContactHours				CH
			Th	Tut	Lab	Total	
1	Microcontroller & Embedded Systems	COE521	2	1	2	5	3
2	Digital Control Systems	COE522	2	2		4	3
4	Graduation Project- 2	COE524			12	12	4
5	Elective Course	COE525	2	2		4	3
7	Elective Course	COE526	2	2		4	3
			8	7	14	29	16

Semester 10 (Power)[16 CHs- 20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	total	
1	Power Systems dynamics & Control	PRE521	2	2		4	3
2	Computer Aided Designs of Electrical Machines	PRE522	2	2		4	3
3	Graduation Project- 2	PRE524			12	12	4
4	Elective Course	PRE525	2	2		4	3
5	Elective Course	PRE526	2	2		4	3
			8	8	12	28	16

Semester10 (Communications & Networks) [18 CHs-20 weeks]

	Title	Code	Contact Hours				CH
			Th	Tut	Lab	Total	
1	Communications Network Management	CNE521	2	1	2	5	3
2	Distributed Systems	CNE522	2	1	2	5	3
3	Communications system Analysis	CNE523	1		3	4	2
4	Graduation Project- 2	CNE524			12	12	4
5	Elective Course	CNE525	2	2		4	3
7	Elective Course	CNE526	2	2		4	3
			9	6	19	34	18

Elective Courses for Control

1- Fuzzy Control Systems
2- Nonlinear Control Systems
3- Robust Control Theory
4- Adaptive Control Systems

Elective Courses for Power

1- Special Electrical Machines
2- Power Generation Economics
3- High Voltage Engineering
4- Renewable & Alternative Energy Source

Elective Courses for Communications & Networks

1- Broad Band Wireless Networks
2- Grid Computing
3- Computer Architecture & Organization
4- Network Operating Systems
5- Network and System Administration

COURSE OUTLINES

Title	*Code*	*Semester/Duration*	*Credits*
Sudanese Studies	SDS211	3/Longitudinal	2,0,0

Sudan: Earth and humans - historical background, cultural Sudan - Sudanese studies on the question of identity in Sudan - the concept of culture applied on the Sudanese Studies - culture

characteristics with reference to the Sudanese society - Sudanese heritage, pluralism and diversity - outs Sudanese culture and specificities and its alternatives - curriculum evolutionary - trickle-down approach - descriptive approach - the theory of cultural worlds - the archaeological method - field trips: the national archaeological. Museum, the natural History Museum of ethnography.

Title	Code	Semester/Duration	Credits
Communication Skills	CSK311	5/Longitudinal	**2,0,0**

Review of sentence elements, basic sentence patterns.

Introduction to Communication: Meaning of communication and business communication, nature scope purpose, principles functions and importance, communication model.

Media of Communication: Introduction, written communication, oral communication, face-to-face communication, visual

communication, audio-visual communication. Advantages and disadvantages of different media.

Types of Communication: External and internal, formal and informal, downward communication, upward communication, horizontal communication, grapevine, merits and demerits, Media used in different types of communication. Barrier to effective

communication and improvement of communication.

Written communication: Letters, memos, reports, writing good business letters, style and structure, pattern and writing techniques

of various business letters, important commercial terms used in office correspondence.

Office memos: Meaning, function and format.

Oral Communication: Speeches, interviews, meetings, conferences, telephonic conversation, techniques, advantages and

disadvantages of different oral communication.

On verbal Communication: Symbols gestures, body language, etc. Visual aid in communication. Fundamentals of Report

Writing: Basics of report writing, report structure, the shorter form, long format reports.

Comprehension and Precise Writing: Passage or paragraph related to business management, decision making, developing

business relations. Entering into business deals, import quotations, bids.

Art of Addressing, Meeting and Conference: Preparingand presenting seminar papers.

Technology of Business Communication: Early development of communication technology, changes resulting from new technology. A look of the future.

Use of Computer in Business Communication: Advantages and limitations.

Title	Code	Semester/Duration	Credits
Calculus-I	MAT111	1/Longitudinal	**2,2,0**

Introduction to Functions: Mathematical and physical meaning of functions, graphs of various functions. Hyperbolic functions.

Introduction to Limits: Theorems of limits and their applications to functions. Some useful limits, right hand and left hand limits, Continuous and discontinuous functions and their applications.

Derivatives: Introduction to derivatives. Geometrical and physical meaning of derivatives. Partial derivatives and their geometrical significance. Application problems (rate of change, marginal analysis)

Higher derivatives: Leibnitz theorem, Rolles theorem, Mean value theorem. Taylor's and Maclaurin's series.

Applications of derivatives: Asymptotes, tangents and normals, curvature and radius of curvature, maxima and minima of a function

of a single variable (applied problems) differentials with applications.

Applications of Partial Derivatives: Euler's theorem, total differentials, maxima and manima of two variables.

Title	Code	Semester/Duration	Credits
Linear Algebra	MAT121	2/Longitudinal	2,2,0

Introduction to matrices, elementary row operations and vector spaces: Brief introduction to matrices. Symmetric and Hermitian matrices, Introduction to elementary row operations, Echelon form and reduced echelon form. Rank of a matrix. Inverse of a matrix by using elementary row operations. Vector spaces. Vector subspaces. Linear combination, Linear dependence and basis, linear,transformation.

System of Linear equations: System of non-homogeneous and homogeneous linear equations, Gaussian elimination method,

Gauss Jardon method, Consistency criterion for solution of homogeneous and nonhomogeneous system of linear equations.

Applications of system of linear equations.

Determinants: Introduction to determinants, Properties of determinants of order n, Axiomatic definition of a determinant.

Applications of determinants (Cramer's Rule).

Title	Code	Semester/Duration	Credits
Calculus- II	MAT122	2/Longitudinal	2,2,0

Integral calculus: Methods of integration by substitutions and by parts. Integration of rational and irrational algebraic functions. Definite integrals, improper integrals, Gamma and Beta functions, reduction formulae.

Applications of integral calculus: Cost function from marginal cost, rocket flights, area under curve.

Vector algebra: Introduction to vectors, Scalar and vector product of three and four vectors. Volume of parallelepiped andtetrahedron.

Vector calculus: Vector differentiation, vector integration and their applications. Operator, gradient, divergence and curl with their applications.

Title	Code	Semester/Duration	Credits
Analytical Geometry	MAT123	2/Longitudinal	2,2,0

Analytic Geometry of 3-dimensions: Introduction Coordinates of a point dividing a line segment in a given ratio. Vector form of a straight line, parametric equations of a straight line, equation of a straight line in symmetric form, direction ratios and direction cosines, angle between two straight lines, distance of a point from a line, Planes: Equation of a plane, angle between two planes, intersection of two planes, a plane and a straight line, skew lines, Cylindrical and spherical coordinate: Introduction to cylindrical and spherical Coordinates, Surfaces: Quadratic surfaces, degenerate surfaces, symmetry, traces, intercepts of the surfaces, surface of revolution, Cylinder and cone: Cylinder, directrix of cylinder, right cylinder, The cone, Sphere: General equation of sphere, great circle.

Title	Code	Semester/Duration	Credits
Complex Functions	MAT211	3/Longitudinal	2,2,0

Complex numbers system and complex variable theory: Introduction to complex number systems, Argand's diagram, modulus and argument of a complex number, polar form of a complex number. DeMoivre's theorem and its applications, Complex functions, analytical functions, harmonic and conjugate, harmonic functions, cauchy-Rehmunn equations (in Cartesian and polar coordinates). Line integrals, Green's theorem, Cauchy's theorem, Chauchy's integral formula, singularities, poles, residues and contour integration and applications.

Title	Code	Semester/Duration	Credits
Differential Equations	MAT212	3/Longitudinal	2,2,0

Ordinary differential equation: formation of differential equations; solution of first order differential equations by various methods; solution of differential equation of first order but higher degrees; solution of general linear equations of second and higher orders with constant co-efficient; solution of Euler's homogeneous linear differential equations. Partial differential equation: introduction, linear and non-linear first order differential equations; standard forms; linear equations of higher order; equations of the second order with variable coefficients.

Title	Code	Semester/Duration	Credits
Vector Analysis	MAT221	4/Longitudinal	2,0,0

Vector Analysis: Vectors and Scalars, Algebra of vectors, Vector differentiation and vector integration, Gradient, Divergence and Curl. Physical significance of Gradient, Divergence and Curl. Green theorem, Divergence theorem, Gauss and Stoke's theorem and their applications and curvilinear coordinate systems.

Title	Code	Semester/Duration	Credits
Statistics and Probability	MAT311	5/Longitudinal	2,2,0

Mean, Median, Mode and Standard Deviation; Samples Space; Definition of Probability; Conditional Probability; General Multiplication Theorem; Independent Events; Bayes' Theorem; Random Variable; Discrete and Continuous Probability Distributions - Probability mass function; Probability density function; Distribution Function; Expectation; Variance; Probability Distribution - Binomial, Poisson and Normal. Correlation and Regression; Method of Least Squares; Linear Curve Fitting.

Title	Code	Semester/Duration	Credits
Numerical Methods	MAT321	6/Longitudinal	2,2,0

Approximation in numerical computation, Truncation and rounding errors; Interpolation: Lagrange's Interpolation, Newton forward & backward differences Interpolation, Newton divided difference; Numerical Integration: Trapezoidal, Rule, Simson's 1/3 Rule, Weddle' Rule;

Numerical Solution of a system of linear equation Gauss elimination method, Matrix Inversion, LU Factorization method, Gauss Jacobi method, Gauss Seidel method; Algebraic Equation: Bisection method, Secant method, Regular-Falsi method, Newton-Raphson method; Numerical solution of ordinary differential equation: Taylor's series method, Euler's method, Runge-kutta method, and Predictor-Corrector method.

Title	Code	Semester/Duration	Credits
Physics-I	PHY111	1/Longitudinal	2,1,2

Physical optics: theories of light; Young's double slit experiment, displacement of fringes and its uses, Fresnel bi-prism, interference at wedge shaped films, Newton's rings, interferometers; diffraction of light; Fresnel and Fraunhoffer diffraction, diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit and n-slits-diffraction grating; polarization; production and analysis of polarized light, Brewster's law, Malus law, polarization by double refraction, retardation plates, nicol prism, optical activity, polarimeters, polaroid. Waves and oscillations: differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, Lissajous figures, spring-mass system, calculation of time period of torsional pendulum, damped oscillation, determination of damping co-efficient; forced oscillation, resonance, two-body oscillations, reduced mass, differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine's formula. Heat and thermodynamics: principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; kinetic theory of gases: Maxwell's distribution of molecular speeds, mean free path, equipartition of energy, Brownian motion, Vander Waal's equation of state, review of the first law of thermodynamics and its application, reversible and irreversible processes, second law of thermodynamics, Carnot cycle; efficiency of heat engines, Carnots theorem, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron equation, Gibbs phase rule, third law of thermodynamics.

Title	Code	Semester/Duration	Credits
Physics -II	PHY121	2/Longitudinal	2,1,2

Structure of matter : crystalline and non-crystalline solids, single crystal and polycrystal solids, unit cell, crystal systems, coordinations number, crystal planes and directions, NaCl and CsCl structure, packing factor, Miller indices, relation between interplanar spacing and Miller indices, Bragg's law, methods of determination of interplanar spacing from diffraction patterns;

defects in solids*:* point defects, line defects, bonds in solids, interatomic distances, calculation of cohesive and bonding energy; introduction to band theory: distinction between metal, semiconductor and insulator.

Electricity and magnetism: Coulomb's law, electric field (E), Gauss's law and its application, electric potential (V), capacitors and capacitance, capacitors with dielectric, dielectric and atomic view, charging and discharging of a capacitor, Ohm's law, Kirchoff's law; magnetic field: magnetic induction, magnetic force on a current carrying conductor, torque on a current carrying loop, Hall effect, Faradays law of electromagnetic induction, Lenz's law, self induction, mutual induction; magnetic properties of matter; hysteresis curve; electromagnetic oscillation: L-C oscillations and its analogy to simple harmonic motion. Modern physics: Michelson-Morley's

experiment, Galilean transformation, special theory of relativity and its consequences; quantum theory of radiation; photo-electric effect, Compton effect, wave particle duality, interpretation of Bohr's postulates, radioactive disintegration, properties of nucleus, nuclear reactions, fission, fusion, chain reaction, nuclear reactor.

Title	Code	Semester/Duration	Credits
General Chemistry	CHM121	2/Longitudinal	2,0,3

Quantum theory; atomic structure, Bohr's theory, Heisenberg's uncertainty principle, Schrödinger's wave equation, electronic configurations and properties of atoms; electronic configurations and properties of molecules: chemical bond, valence bond theory molecular orbital theory, shape of molecules, bond length, bond energy;

Electrochemistry and battery technology: voltaic cells, electrolytic cells, fuel cells, primary, secondary and reserve batteries.

Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc- Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.

Photochemistry; Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Photoprocesses - Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo- sensitisation.Spectroscopy; Electromagnetic spectrum - Absorption of radiation - Electronic, Vibrational and rotational transitions. Width and intensities of spectral lines. Spectrophotometric estimation of iron. UV-visible and IR spectroscopy - principles, instrumentation (Block diagram) and applications.

Polymer chemistry: Introduction: Classification of polymers - Natural and Synthetic; Thermoplastic and Thermosetting. Functionality - Degree of polymerisation. Types and mechanism of polymerisation: Addition, condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight - weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

Nanochemistry: Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: Nanocluster, nanorod, nanotube and nanowire. Synthesis: Precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition Composites - Introduction- definition - constitution- classification- applications of composite materials- fiber reinforced composites-Important types and failures of fiber reinforced composites, Advantages and applications of composites, properties of reinforced composite.

Title	Code	Semester/Duration	Credits
Introduction to Computing	COM111	1/Longitudinal	1,0,2

Introduction to Computer: Overview of Computer organization and historical perspective computer applications in various fields of science and management.

Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions. Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers.

Introduction to OS and Office Automation: Concept of computing, Introduction to Operating Systems such as DOS, windows2000/Xp, UNIX, Client Server Technology, etc. (only brief user level description). Introduction to World Processing, Spread Sheet & Presentation software e.g. MS-Word, MS-Excel, MS-Power Point.

Introduction to Auto CAD: Coordinate System, 2D drafting: lines, circles, arc, polygon, etc., Editing, 3D, Solid modeling, Rendering, Use of Auto CAD for engineering drawing practices.

Web Technologies: Introduction to World Wide Web, Search engines, e-mail, news, gopher, Audio & Video Conferencing, Internet Protocols: FTP, telnet, TCP/IP, SMTP, HTTP, Languages used for WEB **Technology: HTML**, practical examples using DHTML and Static HTML.

Title	*Code*	*Semester/Duration*	*Credits*
Structural programming	COM 211	3/Longitudinal	1,0,3

Concept of programming language and its classification, Programming algorithm and flow chart construction. Writing structured programmes using C language: data types, constants, variables, operators and expressions, assignments and type conversion in assignments, control flow, functions and programme structure, pointers and arrays, strings, advanced data types, pointer to functions, user defined data types, advanced operators, records, input/ output, dynamic variables, and linked lists,file management, recursion and graphics programming.

Title	*Code*	*Semester/Duration*	*Credits*
Data Structure and Algorithms	COM221	4/Longitudinal	1,0,3

Data structure: Introduction to the data structure, advanced data types, static data types, and dynamic data types, linked lists, operations on linked list, stack, operations on stack, queues, operations on queue trees, operations on trees

Algorithms: Introduction to sorting algorithms, bubble sorting algorithm, insertion sorting algorithms, introduction to searching algorithm, sequential searching algorithm, binary search algorithm, jump search algorithm, expontial searching algorithm..etc

Title	*Code*	*Semester/Duration*	*Credits*
Occupational and Environmental Safety	GEN222	4/Longitudinal	2,0,0

Occupational Safety: Develop a deep understanding the concepts of occupational safety and hygiene. For example, OSH professionals and the resources available to assist them, contemporary methods of toxicology and risk assessment of workplace hazards, contemporary issues on chemical hazards in the workplace, measurement of chemical hazards in the workplace,

measurement of physical hazards in the workplace, ergonomics, occupational epidemiology, and national, regional and international guidelines, standards and regulations.

Environmental Safety: Understanding the concepts and issues of environmental health, including environmental toxicology and risk

assessment, population dynamics and geographical information systems, environmental hazards, indoor air quality, ambient air

quality, soil pollution, water pollution, sanitation and wastewater treatment, solid waste disposal and mining pollution, environmental noise, emissions control technologies for air, environmental auditing and impact assessments, environmental impact of tourism, national and regional guidelines, standards and regulations, and International guidelines, standards and regulations.

Title	Code	Semester/Duration	Credits
Engineering Economics	GEN411	7/Longitudinal	2,0,0

1. Economic Decisions Making - Overview, Problems, Role, Decision making process.
2. Engineering Costs & Estimation - Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per-Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.
3. Cash Flow, Interest and Equivalence: Cash Flow - Diagrams, Categories & Computation, Time Value Of Money, Debt repayment, Nominal & Effective Interest.
4. Present Worth Analysis: End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.
5. Cash Flow & Rate Of Return Analysis - Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate Of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits & drawbacks.
6. Uncertainty In Future Events - Estimates And Their Use In Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options.
7. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property,Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.
8. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life Of A New

Asset, Marginal Cost, Minimum Cost Life Problems.

9. Inflation And Price Change - Definition, Effects, Causes, Price Change With Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.
10. Accounting - Function, Balance Sheet, Income Statement, Financial Ratios Capital

Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

Title	Code	Semester/Duration	Credits
Engineering Projects Management	GEN421	8/Longitudinal	2,0,0

The Basic Concepts of Management, Process of planning. Project Planning. Financial Management. PERT, CPM. Managerial decision making and its impact on society: with emphasis on the selection of corporate goals, measures of corporate performance and concepts of industrial regulations and legal aspects.

Organization Theory and Process - Leadership - Motivation - Communication - Conflict Management in Organization.

Plant Location - Plant Layout - Production Planning and Control - Product Design and Development - Channels of Distribution. Materials Management - Inventory Control.

Industrial Disputes and their Settlement - Provision of Factories Act and Industrial Disputes Act. Recent Trends in Contemporary Business Environment.

Title	Code	Semester/Duration	Credits
Research Methodology	GEN422	8/Longitudinal	2,0,0

Problem Selection and Information Collection Definition, Objective, Motivation, Types of Research, Significance, Criteria of Good Research. Defining the Research Problem: Definition of Research Problem, Selection of Problem, Necessity of defining the Problems, Techniques involves in defining the problem.

Research Design: Meaning of Research Design, Need for research Design, Features of a Good Design, Different Design Approach.

Sampling and Measuring information Sampling Design: Census And Sample Survey, Implications of A Sample Design, Steps In Sample Design, Criteria of Selecting A Sampling Procedure, Different Types of Sample Designs, How to Select A Random Sample, Random Sample From An Infinite Universe, Complex Random Sampling Designs. Measuring and Scaling Techniques: Measurement in Research, Measurement Scales, Sources of Error In Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Scale Classification Bases.

Methods of Data Collection: Collection of Primary Data, Observation Method, Interview

Method, Collection of Data, Collection of Secondary Data.

Processing and Analysis of Data Processing Operations, Some Problems In Processing, Elements/Types of Analysis, Statistics In Research, Measures of Central Tendency, Measures of Dispersion, Measures of Relationship, Regression Analysis.

Sampling Fundamentals: Need For Sampling, Important Sampling Distributions, Central Limit Theorem, Sampling Theory, Concept of Standard Error, Estimation, Estimating The Population Mean (M), Estimating Population Proportion, Sample SizeAnd Its Determination

Testing Hypothesis -Basic Concepts Concerning Testing of Hypotheses, Procedure For Hypothesis Testing, Measuring The Power of A Hypothesis Test, Tests of Hypotheses Analysis of Variance and Co-variance : Analysis of Variance (Anova), The Basic Principle of Anova, Anova Technique, Setting up Analysis of Variance Table, Coding Method. Interpretation and Report Writing Meaning of Interpretation, Technique of Interpretation, Precautions in Interpretation, Different Steps in Writing Report, Types of Reports, Precautions for Writing Research Reports.

Title	Code	Semester/Duration	Credits
Values & Ethics in Profession	GEN511	9/Longitudinal	2,0,0

Science, Technology and Engineering as knowledge and as Social and Professional Activities.

Effects of Technological Growth: Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development

Energy Crisis: Renewable Energy Resources Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics. Appropriate Technology Movement of Schumacher; later developments. Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centred Technology..

Ethics of Profession:

Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.

Profession and Human Values: Values Crisis in contemporary society Nature of values: Value Spectrum of a good life Psychological values: Integrated personality; mental health Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Sudanese Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity.

Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Basic Engineering Sciences (All Disciplines)

Title	Code	Semester/Duration	Credits
Engineering Mechanics - Statics	GEN121	2/Longitudinal	2,2,0

statics of particles: forces in plane, forces in space, equilibrium, moment of a force, moment of a couple, equivalent systems of forces on rigid bodies, equilibrium in two dimensions, equilibrium in three dimensions, distributed forces: centroids and centre of gravity, analysis of structures: trusses, frames and machines, internal forces in beams and cables, friction, moments of inertia of areas, moments of inertia of masses, method of virtual work.

Title	Code	Semester/Duration	Credits
Engineering Mechanics-Dynamics	GEN122	2/Longitudinal	2,2,0

Fundamentals of dynamics. Dynamics of particles and rigid body including kinematics and kinetics. Applications of ewton's second law of motion. Analysis of motion in two dimensional and three dimensional spaces. Methods of nergy and momentum. Applications of Dynamics to the engineering concepts.

Title	Code	Semester/Duration	Credits
Workshops Practice	GEN112	2/Longitudinal	0,0,6

Safety Precautions: The use and care of tools and measuring instruments.

Electrical Shop: Electric shock and its treatment, use of megger, wire-guage, phase tester and other electrician's tools, Cables, their sizes, current rating and jointing. Solders and soldering. Main features of domestic installations and appliances, e.g. D.B. system, fluorescent lamps, fans etc. Necessity and methods of earthing, faults and remedies, in wiring circuits. Winding practice of machine coils.

Elementary Machine Shop: Detailed study of centre lathe and accessories. Plain and taper turning, simple screw cutting. Cutting tools and their grinding. Introduction of shaper, slotter, planner, pillar and radial drilling machines.

Fitting Shop: The use and care of fitter's tools. Marking out of jobs. Practice in metal filing, sawing, drilling, Die Sinking, tapping and reaming. Introduction and use of power jack saw and arbor press.

Smithy Shop: The use and care of forging tools and blacksmith tools. Open hearth forge, practice in upsetting, drawing out spreading, bending, cutting and punching, hardening and tempering of small cutting tools. Soldering, brazing, electric and gas welding.

Carpentry Shop: The use and care of timber, its defects and preservation methods. Practice in planning and sawing. Different types of wood joints. Study of sawing, planning, turning and turning machines, pattern making.

Foundry & Pattern Shop: Casting and pattern making.

Title	Code	Semester/Duration	Credits
Electrical & Electronics Workshop	GEN112	2/Longitudinal	0,0,6

1. a. Familiarization of wiring tools, lighting and wiring accessories, various types ofwiring systems
   b. Wiring of one lamp controlled by one switch.
2. a. Study of Electric shock phenomenon, precautions, preventions; Earthing

b. Wiring of one lamp controlled by two SPDT Switches and one 3 pin plug socketindependently

3. a. Familiarization of types of Fuse, MCB, ELCB etc.

b. Wiring of fluorescent lamp controlled by one switch from panel with ELCB & MCB.

4. a. Study of estimation and costing of wiring

b. Domestic appliance - Wiring, Control and maintenance: Mixer machine, ElectricIron, fan motor, pump motor, Battery etc

5. a. Familiarization of electronic components colour code, multimeters.

b. Bread board assembling - Common emitter amplifier.

6. a. Study of soldering components, solders, tools, heat sink.

b. Soldering practice.

Title	Code	Semester/Duration	Credits
Engineering Drawing1	GEN124	2/Longitudinal	0,0,6

Introduction: Graphics as a tool to communicate ideas, lettering and dimensioning. Construction of geometrical figures like pentagon and hexagon.

Orthographic Projection: Principles of orthographic projection, principal and auxiliary planes, First and third angle projections. Projection of points, pictorial view. Projections of lines parallel to both the plane. Parallel to one and inclined to other, inclined to both the Planes Application to practical problems. Projection of sqlid 1h simple position, Axis or slant edge inclined to one and parallel to other plane, Solids lying on a face or generator on a plane. Sectioning of solids lying in various positions, true shape of the section. Development of lateral surfaces, sheets metal drawing.

Isometric Projection: Principles of isometric projection, Isometric projection using box and Offset methods.

Title	Code	Semester/Duration	Credits
Material Science & Characteristics	GEN211	3/Longitudinal	2,1,0

Introduction: Classification of materials; Structure-property Relations; Metals & Alloys, Ce-

ramics, Polymers, Composites andSemiconductors. Atomic Structure & Interatomic Bonding; Fundamentals of Atomic Structure and Chemical Bonding; Atomic

Bonding in Solids. Phase Diagrams: Phase Rules; Single component and Binary Phase diagrams; The Level Rule; Hume-Rothery rules of alloying.

Diffusion in solids: Fick's Laws of Diffusion; The Atomic Model of Diffusion Phase. **Transformations**: Nucleation andGrowth,Recovery, Re crystallization and Grain Growth. Environmental Degradation of materials: Oxidation and Corrosion; Thermal and Photo Degradation; Chemical Degradation; Radiation Damage. Structure of solids: Crystalline and Non-crystalline states; Crystallographic directions and phases; Determination of crystal structures.

Defects and imperfections in solids: Point, Line and Planer defects; Interfacial defects and volume defects; impurities in solids. Elastic, Plastic and Viscoelastic Behaviour of materials: Stress-strain relationship; relaxation and creep; strengthening mechanism

and fracture. Thermal properties of materials: Heat capacity; Thermal expansion and thermal conductivity.

Electrical properties: Electronic and Ionic conduction; Energy Band structures in solids; Electron Mobility; Temperature variation of conductivity.

Dielectric behaviour: Capacitance; Types of polarization; Frequency dependence of dielectric constant; Ferroelectricity andPiezoelectricity in materials.

Magnetic properties: Diamagnetic; Ferromagnetic, antiferromagnetic and Ferrimagneticbehaviour of materials; soft and hard magnetic materials; superconductivity.

Optimal properties: Light interaction with solids; Absorption, Transmission and Reflection; Luminescence; Photoconductivity; Lasers.Materials selection: Material properties and Engineering Design parameters; General effects of processing on parameters; selection of structural; Electronic and Magnetic Materials - case studies.

Title	*Code*	*Semester/Duration*	*Credits*
Mechanical Engineering Principles	GEN212	3/Longitudinal	2,1,0

Basic Concepts: Fundamentals of Heat Transfer, Conduction, Convection, Radiation, Thermal Conductivity, Overall Heat Transfer Coefficients, Practical Equations, Laws of Thermodynamics, Internal Combustion Engines. Heating Ventilation and Air Conditioning (HVAC): Introduction to HVAC components. Heating and cooling load and its calculations;

Comfort charts; Outline of A.C. systems; Consideration for air-conditioning in buildings; natural Ventilations; Insulating materials.

Title	*Code*	*Semester/Duration*	*Credits*
Engineering Drawing2	GEN213	3/Longitudinal	1,3,0

Introduction: Graphic language, Classification of drawings, principles of drawing: IS codes for Machine Drawing, lines, Scales, Sections, Dimensioning, Standard abbreviations.

Orthographic Projections: Principles of first and third angle projections, drawing and sketching of machine elements in Orthographic projections, spacing of views.

Screwed (Threaded) Fasteners: Introduction, Screw thread nomenclature, forms of threads, Thread series, Thread Designation. Representation of threads, Bolted Joints, Locking arrangements, Foundation Bolts. Keys and Cotters: Keys, Cotter Joints.

Shaft Couplings: Introduction, Rigid and flexible coupling.

Riveted Joints: introduction, Rivets and riveting, Rivet heads Classification of riveted

Assembly drawing: Introduction, Engine parts, Stuffing box etc. Free hand sketching: Introduction, Need for freehand sketching, Free hand of Sketching of some threaded fasteners and simple machine Components.

Title	Code	Semester/Duration	Credits
Electrical Circuits Principles	EEE211	3/Longitudinal	2,1,2

Electrical Elements and Circuits: Energy and Energy transfer, Electric charge, electric current, potential difference & voltage, Electric power & energy, Electric circuits, sources, resistance, specific resistance temperature coefficient of resistance, Ohm's law, Fundamental circuit laws, Kirchoff's laws, Direct applications of fundamental laws to simple resistive networks, Introduction to node voltage and loop current methods.

Capacitance: permittivity expression for capacitance, Charging and discharging, series and parallel connection of capacitors.

Title	Code	Semester/Duration	Credits
Electrical Circuits Theory	EEE221	4/Longitudinal	2,1,2

Introduction to microprocessors and their architecture; Microprocessor C/Assembly Generation of alternating emf, introduction to periodic functions, RMS or effective, Average and maximum values of current & voltage for sinusoidal signal wave forms. Introduction to phasor representation of alternating current. Power and A.C. circuit, active power, reactive power apparent power and power factor.

Title	Code	Semester/Duration	Credits
Digital Electronics Systems	EEE222	4/Longitudinal	2,1,2

Introductory Concepts: Number Systems, Base Conversion Methods, Complements of Numbers, Codes, Error detecting and Error Correcting Codes.

Minimization of Boolean Functions: Standard forms of Boolean Functions, Simplification of

Functions - Karnaugh map and QuineMcClusky methods, multiple output functions.

Logic Gates: Symbols and Truth Tables of Gates - AND, OR, NOT, NAND, NOR, XOR, Multiplexers, Demutiplexers, Encoders, Decoders.

Combinational Logic: Logic Design of Combinational circuits - Binary addition, Subtraction, Code Conversion, Priority Encoders, Decoders, Seven segment Displays, Comparators, PLAs.

Title	*Code*	*Semester/Duration*	*Credits*
Electrical & Electronic Drawing	EEE312	5/Longitudinal	1,2,0

Electrical and Electronic Symbols: Electrical and Electronic symbols use in Electrical and Electronic installations like light, power, alarm and control circuits etc. Simple Light Circuits: Schematic and wiring diagrams for the following circuits:

- Light and fan points controlled by individual switches
- Fluorescent tube controlled from one switch
- One lamp controlled by two switches (stair case circuit)
- Two lamps controlled by three switches (Double staircase circuit)

Simple Alarm Circuits Without and With Relays Schematic and wiring diagrams for the following circuits:

- One bell controlled by one push button
- Two ordinary bells (for day and night) used at a Doctor's residence.
- Bell response circuit using one bell and a relay
- Bell response circuit of an office (for three rooms)
- Traffic control light system for two road crossing
- A light circuit which gets automatically connected to DC supply in case of power failure

House Wiring: Installation plan, single line wiring diagram, selection and rating of necessary equipment and to prepare a list of material required for electrical wiring of a small house (In batten/concealed conduit system). Determination of sizes of distribution boards for multistoried buildings. Introduction to concept of rate schedules

Service Line Connection: Layout diagram (from supply pole to building) and to prepare a list of material required for giving service line connection (For single phase and threephase small loads) Power **Wiring For a Small Workshop**: Installation plan, single line wiring diagram, selection and rating of necessary equipment and to prepare a list of material required for a small workshop. Determination of sizes of panels for given loads. Introduction to concept of rate schedule.

Title	Code	Semester/Duration	Credits
Digital Electronics Design	EEE311	5/Longitudinal	2,0,2

Sequential Machine Fundamentals: The Flip-flop - RS, JK and D Flip-flops, the Design of Clocked Flip-flop, Flipflop conversion

from one type to another. Counters and Registers.

Traditional Approaches to Sequential Analysis and Design: Analysis and Design of Finite State Machines, State Reduction, Design of Flipflops, Counters and Shift Registers.

Asynchronous Finite State Machines: Analysis and Design of Asynchronous Machines, Cycles, Races and Hazards.

Title	Code	Semester/Duration	Credits
Analog Electronics Fundamentals	EEE223	4/Longitudinal	2,1,2

Energy Band Theory of Solids: Intrinsic and Extrinsic Semiconductors Doping, Doping Materials, Carrier Mobility, Conductivity, Diffusion and continuity equation, Hall - Effect and its Application.

Semiconductor Diodes: Band structure of PN Junction, Quantitative Theory of PN Diode, Volt - Amp. Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction, Zener and Avalanche Breakdowns, Tunnel Diode, LED, Schottky Barrier Diode, Varactor Diode, Photo Diode, PIN Diode, Point Contact Diode.

Diode Rectifiers: Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics.

Bipolar Junction Transistor: NPN and PNP junction Transistor, Characteristics of Current Flow across the Base Regions, Minority and Majority Carrier Profiles, CB, CE and CC Configurations and their Input and Output Characteristics. Comparison of CE, CB and CC Configurations. Junction Biasing for Saturation, Cutoff and Active Region, Ş and ş Parameters and the relation between them.

JFET: JFET and its characteristics, Pinch off Voltage, Drain Saturation Current, MOSFET - Enhancement and Depletion Modes, Small signal models of FET.

Transistor Biasing Circuits: Various Biasing Circuits and Stabilization, Thermal Runaway, Thermal Stability, Biasing of FETs. Small Signal - Low Frequency Transistor Biasing Circuits: Transistor as an Amplifier, h - parameter model, Analysis of Transistor Amplifier Circuits using h - parameters. CB, CE and CC Amplifier configurations and performance factors. Analysis of Single Stage Amplifier, RC Coupled Amplifiers. Effects of Bypass and Coupling Capacitors. Frequency Response of CE Amplifier,Emitter - Follower, Cascaded Amplifier, High Frequency model of Transistor.

Title	Code	Semester/Duration	Credits
Electrical Circuits Analysis	EEE313	5/Longitudinal	2,1,2

Network Theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Reciprocity theorem, star delta transformation for D.C and A.C circuits. Single-phase and three phase circuit analysis.

Two port network: Introduction, characterization of linear time-invarient, two ports by six sets of parameters. Relationship among parameter sets. Inter connection of two ports.

Title	Code	Semester/Duration	Credits
Measurements & Instrumentations	EEE314	5/Longitudinal	2,1,2

Measurements: Method of measurement, Measurement system, Classification of instruments, Definition of accuracy, Precision, Resolution, Speed of response, Error in measurement, Classification of errors, loading effect due to shunt and series connectedinstruments.

Analog meters: General features, Construction, Principle of operation and torque equation of Moving coil, Moving iron, Electrodynamometer, Induction instruments, Principle of operation of the Electrostatic, Thermoelectric, Rectifier type instruments, Extension of instrument ranges and multipliers.

Instrument transformer: Disadvantage of shunt and multipliers, Advantage of Instrument transformers, Principle of operation of Current& Potential transformer, errors.

Measurement of Power: Principle of operation of Electrodynamic& Induction type wattmeter. Wattmeter errors.

Measurement of resistance: Measurement of medium, low and high resistances, Megger.

Measurement of Energy: Construction, theory and application of AC energy meter, testing of energy meters.

Potentiometer: Principle of operation and application of Crompton's DC potentiometer, Polar and Co-ordinate type AC potentiometer. Application.

AC Bridges: Measurement of Inductance, Capacitance and frequency by AC bridges.

Cathode ray oscilloscope (CRO): Measurement of voltage, current, frequency & phase by oscilloscope. Frequency limitation of CRO. Sampling and storage oscilloscope, Double beam CRO.

Electronic Instruments: Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digitalmeters, Digital multimeter, Digital frequency meter, Signal generator.

Title	Code	Semester/Duration	Credits
Communications Principles	EEE315	5/Longitudinal	2,1,2

Linear Modulation Systems: Need for Modulation, Frequency Translation, Method of Frequency Translation, Amplitude Modulation, Modulation Index, Spectrum of AM Signal, Modulators and Demodulators (Diode detector), DSB-SC Signal and its Spectrum, Balanced Modulator, Synchronous Detectors, SSB Signal, SSB Generation Methods, Power Calculations in AM Systems, Application of AM Systems.

Angle Modulation Systems: Angle Modulation, Phase and Frequency Modulation and their Relationship, Phase and Frequency Deviation, Spectrum of an FM Signal, Bandwidth of Sinusoidally Modulated FM Signal, Effect of the Modulation Index on Bandwidth, Spectrum of Constant Bandwidth FM, Phasor Diagram for FM Signals,

FM Generation: Parameter variation method, Indirect method of Frequency Modulation (Armstrong Method), Frequency Multiplication, PLL FM Demodulator, Pre - emphasis and De - emphasis, Comparison of FM and AM.Noise In AM and FM Systems: Sources of Noise, Resistor Noise, Shot Noise, Calculation of Noise in a Linear System, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Threshold Improvement inDiscriminators, Comparisons between AM and FM.

Radio Transmitters: Classification of Radio Transmitters, AM and FM Transmitters, Radio Telegraph and Telephone Transmitters, SSB Transmitters.

Radio Receivers: Radio receiver Types, AM Receivers - RF Section, Frequency Changing and Tracking, Intermediate Frequency and IF Amplifiers, Automatic Gain Control (AGC); FM Receivers - Amplitude Limiting, FM Demodulators, Ratio Detectors, ISB Receiver, Comparison with AM Receivers.

Communication Receivers: Extensions of the Super-heterodyne Principles, Additional Circuits.

Title	*Code*	*Semester/Duration*	*Credits*
Analog Electronics Circuits	EEE321	6/Longitudinal	2,1,2

Multistage Amplifiers: BJT and FET RC Coupled Amplifiers - Frequency Response. Cascaded Amplifiers. Calculation of Band Width of Single and Multistage Amplifiers. Concept of Gain Bandwidth Product.

Feed back Amplifiers: Concept of Feedback Amplifiers - Effect of Negative feedback on the amplifier Characteristics. Four Feedback Amplifier Topologies. Method of Analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers.

Sinusoidal Oscillators: Condition for oscillations -LC Oscillators - Hartley, Colpitts, Clapp and Tuned Collector Oscillators -Frequency and amplitude Stability of Oscillators - Crystal Oscillators - RC Oscillators -- RC Phase Shift and Weinbridge Oscillators.

Power Amplifiers: Classification of Power Amplifiers - Class A, Class B and Class AB power Amplifiers. Series Fed, Single Ended Transformer Coupled and Push Pull Class A and Class B Power Amplifiers. Cross-over Distortion in Pure Class B Power Amplifier, Class AB Power Amplifier - Complementary Push Pull Amplifier with trickle Bias, Derating Factor - Heat Sinks.

Tuned Voltage Amplifiers: Single Tuned and Stagger Tuned Amplifiers - Analysis - Double Tuned Amplifier - BandwidthCalculation.

Operational Amplifiers: Concept of Direct Coupled Amplifiers. Ideal Characteristics of an operational Amplifier - Differential Amplifier - Calculation of common mode Rejection ratio - Differential Amplifier supplied with a constant current - Normalized Transfer Characteristics of a differential Amplifier - Applications of OP-Amp as an Inverting and Non-Inverting Amplifier, Integrator, Differentiator Summing and Subtracting Amplifier and Logarithmic Amplifier. Parameters of an Op-Amp, Measurement of OP-Amp Parameters.

Title	Code	Semester/Duration	Credits
Control Theory	EEE322	6/Longitudinal	2,2,0

Input / Output Relationship: Introduction to open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical, Mechanical and Thermal), derivation of transfer function for different of types of systems, block diagram & signal flow graph, Reduction techniques, Mason's Gain formula.

Time - Domain Analysis: Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID controllers.

Frequency Domain Analysis: Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode plots), gain and phase margins, relative stability. Correlation with time domain, constant M & N circles, close loop frequency responses, from open loop response.

Concept of Stability: Asymptotic stability and conditional stability, Routh - Hurwitz criterion, Nyquist stability criterion, Root locus plots and their applications.

Title	Code	Semester/Duration	Credits
Electromagnetic Fields Theory	EEE323	6/Longitudinal	2,2,0

Electrostatics: Coulomb‟s law, force, electric field intensity, flux density, Gauss‟s law and its application, electrostatic potential, boundary conditions, method of images, Laplace‟s and Poisson‟s equations, energy of an electrostatic system, conductors and dielectrics.

Magnetostatics: Concepts of magnetic field, Ampere‟s law, Biot-Savart‟s law, vector magnetic potential, energy of magnetostatic system, mechanical forces and torques in electric and magnetic fields. Curvilinear co-ordinates, rectangular, cylindrical and

spherical coordinates, solutions to static field problems. Graphical field mapping with applications, solution to Laplace equations, rectangular, cylindrical and spherical harmonics with applications.

Maxwell‟s equations: their derivatives, continuity of charges, concepts of displacement cur-

rents. Boundary conditions for timevarying systems. Potentials used with varying charges and currents. Maxwell"s equations in different coordinate systems.

Title	Code	Semester/Duration	Credits
Sensors & Transducers	EEE411	7/Longitudinal	2,1,2

Mechanical and Electromechanical sensor: Definition, principle of sensing & transduction, classification.

Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity.

Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes.

Inductive sensor: common types- Reluctance change type, Mutual inductance change type, transformer action type, Magnetostrictive type, brief discussion with respect to material, construction and input output variable, Ferromagnetic plunger type, short analysis.

LVDT: Construction, material, output input relationship, I/O curve, discussion.

Proximity sensor

Capacitive sensors: Variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity. Stretched diaphragm type: microphone, response characteristics.

Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

Thermal sensors: Material expansion type: solid, liquid, gas & vapor

Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermister material, shape, ranges and accuracy specification.

Thermo emf sensor: types, thermoelectric power, general consideration,Junction semiconductor type IC and PTAT type.

Radiation sensors: types, characteristics and comparison. Pyroelectric type.

Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil

sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics.

Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive cell types, materials, construction, response. Geiger counters, Scintillation detectors, Introduction to smart sensors.

Title	Code	Semester/Duration	Credits
Microprocessors and Applications	EEE412	7/Longitudinal	2,1,2

Internal Architecture and Functional Description of INTEL 8085, Microprocessor Interrupt

Structure of 8085, Instruction Set and Timing Diagrams.

Programming The 8085: Introduction to 8085 Assembly Language Programming, Sample Programs - Stack and Subroutines.

Interfacing Semiconductor Memory Devices To 8085: Classification and Internal Organization of Semiconductor Memory Devices, Interfacing of SRAMs, DRAMs and EPROMs. Interfacing I/O Devices to 8085: Parallel I/O (8255A), Timer/Counter (8253), Serial I/O (8251A), Keyboard/Display Interface.

Data Converters: ADC, DAC, and their Interfacing to 8085. Elementary Concepts of 16Bit and 32Bit Microprocessors, like INTEL 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro.

Title	Code	Semester/Duration	Credits
Computer Aided Design	COM321	6/Longitudinal	1,0,3

MATLAB basics: The MATLAB environment - Basic computer programming - Variables and constants, operators and simple calculations - Formulas and functions - MATLAB toolboxes.

Matrices and vectors: Matrix and linear algebra review - Vectors and matrices in MATLAB - Matrix operations and functions in MATLAB.

Computer programming: Algorithms and structures - MATLAB scripts and functions (m-files) - Simple sequential algorithms - Control structures (if…then, loops).

MATLAB programming: Reading and writing data, file handling - Personalized functions - Toolbox structure - MATLAB graphic functions.

Numerical simulations: Numerical methods and simulations - Random number generation - Montecarlo methods.

Hands-on session: Interactive hands-on-session where the whole class will develop one or more MATLAB scripts that solve an assigned problem.

Applied Sciences (Control)

Title	Code	Semester/Duration	Credits
Elements of Power Systems	CPE321	6/Longitudinal	2,2,0

General layout of a power system and its components, generation, transmission, distribution, utilization, control, thermal generationand its different types, hydro-electric generation, renewable energies, comparison of methods of generation.

Overhead transmission line: Choice of frequency, Choice of voltage, Types of conductors, Inductance and Capacitance of a singlephase and three phase symmetrical and unsymmetrical configurations. Bundle conductors. Transposition. Concept of GMD and GMR. Influence of earth on conductor capacitance.

Overhead line construction: Line supports, Towers, Poles, Sag, Tension and Clearance, Effect of Wind and Ice on Sag. Dampers.

Insulators: Types, Voltage distribution across a suspension insulator string, String efficiency, Arching shield & rings, Methods of

improving voltage distribution across Insulator strings, Electrical tests on line Insulators.

Corona: Principle of Corona formation, Critical disruptive voltage, Visual critical corona discharge potential, Corona loss, advantages & disadvantages of Corona. Methods of reduction of Corona.

Cables: Types of cables, cable components, capacitance of single core & 3 core cables, dielectric stress, optimum cable thickness, grading, dielectric loss and loss angle.

Characteristics and Performance of transmission lines: Short, medium (nominal, T) and long lines and their representation.A.B.C.D constants, Voltage regulation, Ferranti effect, Power equations and line compensation, Power Circle diagrams.

Tariff: Guiding principle of Tariff, different types of tariff.

Sudanese Electricity Rule: General Introduction.

Title	*Code*	*Semester/Duration*	*Credits*
Electromechanical Conversion	CPE322	6/Longitudinal	2,1,2

Electromechanical Energy Conversion: Forces and torques in magnetic field systems. Energy balance. Singly excited system. Coenergy. Multiply excited system. Dynamic equations.

D.C. Machines Fundamentals: Simple linear machine. A loop rotating between pole faces. Communication. Armature construction. Armature reaction. Induced voltage and torque equation. Construction. Power flow and losses.

D.C. Generators: Equivalent circuit Magnetization curve. Separately existed; shunt, series and compounded generators. Paralleloperation.

D.C. Motors: Equivalent circuit. Separately excited; Shunt, permanent magnet, series and compounded motors.

Speed control of DC motors: Starters, speed control methods for series, shunt and compound motors, series parallel control for traction motor, multivoltage control, plugging, Dynamic braking, testing efficiency and temperature rise, determination of losses,

divert and indirect test, estimation of temperature rise of armature, commutator and field winding, Efficiency.

Transformers: Transformer Fundamentals, Importance of transformers. Types and construction. Ideal transformer. Theory andoperation of real Single-phase transformers phasor diagrams. Leakage reactance. Losses. Equivalent circuit parameters. No load and short circuit

test per Unit systems. Voltage regulation and efficiency. Autotransformers. Tapping. Parallel operation and load division. Inrush current. Exciting current. Three phase transformer. Per unit system. Three phase connections and harmonic Suppression. Vector groups. Three phase transformation using two transformers.

Title	Code	Semester/Duration	Credits
Electrical Power Utilization	CPE411	7/Longitudinal	2,2,0

Radiation and vision: Physics of light-wave theory, quantum theory, unified theory, photon generation, visible wavelength range, standard observer curve, different forms of energy converted to visible radiation, spectral power distribution curve. Quantities, units, standards and measurement: Luminous energy, luminous flux, spectral radiant flux, solid angle, luminous intensity,luminance, illuminance, luminous efficacy. Colour temperature, colour rendering index, reflectance, diffuser, etc. Lambert's cosine law, inverse square law and cosine law of illumination. Polar curve, Roussea's diagram, illuminance (flux) meter, bench photometer (intensity measurement), integrating sphere (flux measurement).Optical system of human eye.

Sources of light: Construction and electrical circuits of different sources of light, filament lamps, halogen temps, discharge lamps -sodium and mercury high pressure discharge lamps, tube and CFL lamps.

Lighting calculations for indoor and outdoor applications: Shop lighting, factory lighting, street lighting, flood lighting. Electric heating, welding and electroplating: Induction heating - principle of operation, scope of high frequency and low frequency heating, induction heating, power supplies at different frequencies.Induction heating furnaces—coreless and core types.

Arc heating: AC arc heating - different arc electrodes, direct and indirect arc furnace and their power supply systems, electrode regulators, condition for maximum output, necessity of reactor in arc furnace, general arc furnace transformer construction, energy balance in arc furnace, advantages of direct arc furnaces.

DC arc furnace supply system, different bottom electrodes, twin shell DC EAF (electrode arc furnace) system, advantages of DC archeating.

Dielectric heating: Principle of operation, choice of voltage and frequency, electrode configuration.

Resistance heating: Different resistance heating materials and their properties, causes of failures.

Direct and indirect resistance heating furnace. Design of resistance elements.

Electric welding: Resistance and arc welding and equipment for such welding.

Electrolysis: Application of electrolysis, electro deposition, electro extraction, electro refining.

Title	Code	Semester/Duration	Credits
Optimization Techniques	CPE412	7/Longitudinal	2,2,0

Linear Programming:- Introduction-Formulation of LP, Solution to LP-Graphical method. Sim-

plex method-Big M method-Two phase method.Dual Simplex method-Revised simplex method, Duality. Transportation models, Assignment models.

Dynamic Programming:- Introduction-Formulation of DP, Principle of optimality, System reliability, Solution of LPP by DP. Application of DP in shortest route-cargo handling-allocation-scheduling problem. Network models: - CPM and PERT.

Nonlinear programming:- Introduction-Formulation of NLP, local and global optimum, concave and convex functions, types of NLP. Unconstrained one -d optimization: - Necessary and sufficient conditions, unrestricted search methods-Region elimination methods-Dichotomous search-Interval halving method, Fibonacci method-Golden section method, Gradient search methods-Bisection method-Secant method-Newton Raphson method-Quadratic interpolation method.

Multivariable NLP without constraints:- Classical methods-limitations, Numerical methodsUnivariant method-Conjugate direction method-Steepest descend method-Newtons method. Multivariable NLP with constraints:-Necessary and sufficient conditions-Equality and inequality constraints, Kuhn Tucker conditions, Gradient projection method-cutting plane method-penalty function method.

Title	Code	Semester/Duration	Credits
Electrical Machines	CPE413	7/Longitudinal	2,1,2

Induction machines: Construction, Double revolving field theory, Cross field theory, Starting methods, Speed-Torque characteristics, Phasor diagram, Condition of Maximum torque, Determination of equivalent circuit parameters, Testing of Single phase motors, Applications. Single phase AC series motor, Compensated and uncompensated motors.

3-Phase Induction machine: Induction motor as a Transformer, Flux and MMF phasors in Induction motors, Equivalent circuit, Performance equations, Induction motor phasor diagram· Toque-slip characteristic, Power slip characteristic, Determination of equivalent circuit parameters. Methods of starting of squirrel Cage and Wound rotor Motors. Speed control of Induction motor· Polarity Test, Application of Polyphase Induction motor.

Synchronous Machines: Construction, Types, Excitation systems, Generator & Motor modes, Armature reaction, Theory for salient pole machine, Two reaction theory, Voltage regulation (EMF,MMF, ZPF). Operating characteristics of Alternators and their rating. Power angle characteristics of Synchronous machines.

Parallel operation of Alternators, Synchronous machine connected to infinite bus, effect of change of excitation and speed of prime mover. Starting of Synchronous motor, V-curve. Damper winding, Hunting. Short circuit transients. Applications.

Title	Code	Semester/Duration	Credits
Power Electronics	CPE421	8/Longitudinal	2,1,2

Introduction: Concept of power electronics, application of power electronics, uncontrolled

converters, advantages and disadvantages of power electronics converters, power electronics systems, power diodes, power transistors, power MOSFETS,IGBT and GTO.

PNPN devices: Thyristors, brief description of members of Thyristor family with symbol, V-I characteristics and applications. Twotransistor model of SCR, SCR turn on methods, switching characteristics, gate characteristics, ratings, SCR protection, series and parallel operation, gate triggering circuits, different commutation techniques of SCR.

Phase controlled converters: Principle of operation of single phase and three phase half wave, half controlled, full controlled converters with R, R-L and RLE loads, effects of free wheeling diodes and source inductance on the performance of converters. External performance parameters of converters, techniques of power factor improvement, single phase and three phase dual converters.

DC-DC converters: Principle of operation, control strategies, step up choppers, types of choppers circuits based on quadrant of operation, performance parameters, multiphase choppers and switching mode regulators.

Inverters: Definition, classification of inverters based on nature of input source, wave shape of output voltage, method ofcommutation & connections. Principle of operation of single phase and three phase bridge inverter with R and R-L loads, performance parameters of inverters, methods of voltage control and harmonic reduction of inverters. Brief idea of Resonant Pulse inverters.

AC controllers: Principle of on-off and phase control, single phase and three phase controllers with R and R-L loads. Principle of operation of cycloconverters, circulating and non circulating mode of operation, single phase to single phase step up and step down cycloconverters, three phase to single phase Cycloconverters, three phase to three phase Cycloconvetter.

Applications: Speed control of AC and DC motors. HVDC transmission. Static circuit breaker, UPS, static VAR controller.).

Title	*Code*	*Semester/Duration*	*Credits*
Industrial Control Systems	CPE422	8/Longitudinal	2,0,2

Introduction to Programmable Logic Controllers: Overview, Functions & Features, Typical areas of Application, PLC vsPersonal Computers, PLC vs Dedicated Controllers, Logic Contact Symbology, Binary & Hexadecimal conversions, Input / output addressing.

PLC Hardware: Backplane & Rack, Power Supply Module, Programmable Controller, Discrete Input / output Modules, Analog Input / output Modules, Special Function Input / output Modules, Network Interface Modules, Serial Communication Interface, Memory modules, Proprietary Cables & accessories, Redundancy - overview, Introduction to Remote Input / outputs.

System Configuration: Finalization of Input / output Module count,Rack Configuration, Power

Supply Limits, Communication Limits, Input / Output allotment & addressing, Finalization of Derived Function Blocks.

Fundamentals of PLC Programming: Configuration, Ladder Logic (LD), Function Block Diagram (FBD), Instruction List (IL),Structured Text (St), Sequential Function Chart (SFC), Arithmetic Functions, Logic Functions, Timers and Counters,Communication Instructions, Data Transfer Instructions, System Bits and Words, Function Blocks, Derived Function Blocks, PID Function Blocks.

PLC Programming - Implementation: Configuration of Rack, Configuration of Controller, Configuration of Network Modules,Configuration of Input Output Modules, Structuring a programme, Creation of database, Programmer's console, Downloading / Uploading Projects, PLC Modes (RUN, STANDBY, MONITOR), Simulation & Testing, Loop tuning & Parameter setting, On line Monitoring / debugging, Diagnostic features.

Distributed Control System (DCS): Concept of DCS, Data Acquisition Basics, Data Control Basics, DCS Architecture,Proprietary Networks, Advantages & Limitations, Overview of configuration & programming.

Supervisory Control & Data Acquisition (SCADA): Introduction to SCADA, SCADA Architecture, Communication table for signal exchange, Introduction to communication protocols,Creation of Database, Interfacing with PLC, Operating Screens, Applicationprogramming, Simulation / RUN time, Alarms, Trends & Bar graphs, Historical Data Management.

Title	*Code*	*Semester/Duration*	*Credits*
Signals & Systems Analysis	CCN411	7/Longitudinal	2,2,0

Signals, Transformations of Independent Variables, Basic Continuous Time Signals, Basic Discrete Time Signals, Systems,Properties of Systems, Linear Time - invariant Systems.

Linear Time - Invariant (LTI) Systems: Representation of Signals in terms of Impulses, Discrete Time LTI Systems, the Convolution Sum, Continuous Time LTI Systems, the Convolution Integral. Properties of LTI Systems, Systems Described by Differential and Difference Equations. Block Diagram Representation of LTI Systems Described by Differential Equations and, Singularity Functions. Analogy between Vectors and Signals, Orthogonal Vector and Signal Spaces. Approximation of a Function by a Set of Mutually Orthogonal Functions, Fourier Analysis of Continuous Time Signals and Systems. The Response of Continuous Time LTI Systems to Complex Exponentials, the Continuous Time Fourier series. Convergence of Fourier series, A-periodic Signals and Continuous Fourier Transform. Periodic Signals and Continuous Fourier Transform. Convolution and Modulation Property. Polar Representation of Continuous Fourier Transform. Frequency Response Characterized by Linear Constant Coefficient Differential Equations. First-order and Second-order Systems.Fourier Analysis of Discrete Time Signals and Systems Response of Discrete Time LTI Systems to Complex Exponential. Fourier Series, DTFT, Periodic Signals and DTFT, Properties of DTFT, Convolution, Modulation and Duality Property. Polar Representation of DTFT, First-order and Second-order Systems.

Concept of Z: Sampling Theorem, Reconstruction of a Signal from Samples, the Effect of Undersampling, Discrete Time Processing of Continuous Time Signals. Sampling in Frequency Domain, Sampling of Discrete Time Signals. Z-transform of a Discrete Sequence, Region of Convergence for the Z-transform. Inverse Z-transform, Properties of Z-transform, Relation Between Z and Fourier Transform..

Title	Code	Semester/Duration	Credits
Digital Signal Processing	CCN421	8/Longitudinal	2,2,0

Discrete-time signals: Concept of discrete-time signal, basic idea of sampling and reconstruction of signal, sampling theorem, sequences,-periodic, energy, power, unit-sample, unit-step, unit ramp & complex exponentials, arithmetic operations on sequences.

LTI systems: Definition, representation, impulse response, derivation for the output sequence, concept of convolution, graphical, analytical and overlap-add methods to compute convolution supported with examples and exercise, properties of convolution, interconnection of LTI systems with physical interpretations, stability and causality conditions, recursive and nonrecursive systems.

Discrete Time Fourier Transform(DTFT): Concept of frequency in discrete and continuous domain and their relationship (radian and radian/sec), freq. response in the discrete domain. Discrete system's response to sinusoidal/complex inputs (DTFT), Representation of LTI systems in complex frequency domain.

Z- Transforms: Definition, mapping between s-plane & z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples & exercises, characteristic families of signals along with ROC, convolution, correlation and multiplication using Z- transform, initial value theorem, Perseval's relation, inverse Ztransform by contour integration, power series & partial-fraction expansions with examples and exercises.

Discrete Fourier Transform: Concept and relations for DFT/IDFT, Relation between DTFT & DFT. Twiddle factors and their properties, computational burden on direct DFT, DFT/DFT as linear transformation, DFT/IDFT matrices, computation of DFT/IDFT by matrix method, multiplication of DFTs, circulation convolution, computation of circular convolution by graphical, DFT/IDFT and matrix methods, linear filtering using DFT, aliasing error, filtering of long data sequences- Overlap-Save and Overlap-Add methods with examples and exercises.

Fast Fourier Transforms: Radix-2 algorithm, decimation-in-time, decimation-in-frequency algorithm, signal flow graph, Butterflies, computations in one place, bit reversal, examples for DIT & DIF FFT Butterfly computations and exercises.

Filter design: Basic concepts of IIR and FIR filters, difference equations, design of Butterworth IIR analog filter using impulse invariant and bilinear transform, design of linear phase FIR filters no. of taps, rectangular, Hamming and Blackman windows. Effectof quantization.

Digital Signal Processor: Elementary idea about the architecture and important instruction sets of TMS320C 5416/6713 processor, writing of small programmes in assembly Language.

FPGA: Architecture, different sub-systems, design flow for DSP system design, mapping of DSP alrorithms onto FPGA.

Title	Code	Semester/Duration	Credits
Artificial Neural Networks	CCN511	9/Longitudinal	2,2,0

Machine Learning& AI - Introduction, hierarchical perspective and foundations. Rote Learning, Learning by advice, Learning in problem solving inductive learning, explanation based learning, learning from observation and discovery, learning by analogy,introduction to formal learning theory. Biological neurons and brain, models of biological neurons, artificial neurons and neural networks, Early adaptive nets Hopfield nets, back error propagation competitive learning lateral inhibition and feature maps, Stability - Plasticity and noise saturation dilemma,

ART nets, cognition and recognition. Neural nets as massively parallel, connectionist architecture, Application in solving problems from various are as e.g., AI, Computer Hardware, networks, pattern recognition sensing and control etc.

Title	Code	Semester/Duration	Credits
Control Systems	COE421	8/Longitudinal	2,1,2

Correlation between Time and Frequency Responses - Polar Plots - Bode Plots - Log Magnitude versus Phase Plots - All Passand Minimum Phase Systems - Nyquist Stability Criterion - Assessment of Relative Stability - Constant M and N Circles.

Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques, feedback compensation using P, PI, PID controllers.

Title	Code	Semester/Duration	Credits
Instruments systems & Signals	COE422	8/Longitudinal	2,2,0

General measurement systems: specifications of instruments, their static and dynamic Characteristics. Active and passive transducers and their classification. Transducers: Resistance type - potentiometer, strain gauge; Inductive type - LVDT, RVDT

Sensing elements: Temperature sensing elements - RTD, thermistor, thermocouple, semiconductor IC sensors; Pressure sensing elements - manometers, elastic elements, Bourdon tube, diaphragm, bellows; Electrical type - McLeod gauge, Pirani gauge; Flow sensing transducers. Velocity measurement. Electromagnetic flow meter, Coriolis flow meter, Ultrasonic flow meter; capacitive

sensors. Photo conductive sensors - Capacitive sensors- Variable area - Variable distance - Variable dielectric type sensors.Analytical sensors - pH measurement. Hall effect transducer. **Feedback transducer systems, data display and recording systems**: Self balancing sys-

tems, servo operated system, data-loggers, analog and digital data acquisition systems, Analog and magnetic tape recorders, digital input-output devices. MEMS- principle of operation, materials, basic process, manufacturing technology.

Telemetry: Data transmission - methods of data transmission, current, voltage, and position telemetry systems. Modulation

techniques: FM, AM, ASK, FSK, Time division and frequency division multiplexing, applications, signal isolation techniques (MCT2E). Digital methods of frequency, phase and time period measurements.

Optical instruments: Eye, telescopes, microscopes, photographic lenses, optical projection systems, cameras, Abbe's refractromete, monochromatic. Thermal detectors and Quantum detectors, bolo meter, Photodiodes- PIN and avalanche photodiodes, phototransistors, photo multipliers, IR detectors. CCD devices - principle and operation.

Title	Code	Semester/Duration	Credits
Multivariable Control Systems	COE511	9/Longitudinal	2,2,0

Introduction: Concept of Linear vector space Linear Independence, Bases & Representation, domain and range. Concept ofLinearity, relaxedness, time invariance, causality. State Space **Approach of Control System Analysis**: Modern Vs conventional control theory, concept of state, state variable state vector, state space, state space equations, Writing state space equations of mechanical, Electrical systems, Analogous systems. State Space Representation using physical and phase variables, comparison form of system representation. Block diagram representation of state model. Signal flow graph representation. State space representation using canonical variables. Diagonal matrix. Jordan canonical form, Derivation of transfer functions from state-model.

Solution of State Equations: Eigenvalues and Eigen vectors. Matrix, Exponential, State transition matrix, Properties of state transition matrix. Computation of State transition matrix concepts of controllability & observability, Pole placement by state feedback.

Title	Code	Semester/Duration	Credits
Optimal Control Theory	COE512	9/Longitudinal	2,2,0

Introduction: Optimal control problem. Problem Formulation. Performance measures for various types of optimal control problems -Minimum time problem- Minimum fuel problem- Minimum energy problem- Tracking problem- Regulator problem—selection of a performance measure-Example..

Dynamic programming:The optimal control law- principle of optimality-Recurrence relation of dynamic programming- computational procedure for solving optimal control problems-Characteristics of Dynamic programming solution-Discrete linear regulator problem-Hamilton Jacobi Bellman equation-Continuous linear regulator problem.

Calculus of variations: Fundamental concepts. Functional of single function- Euler - equation-General variation of a functional-Functionals of several independent functions- Boundary conditions. Piecewise smoothextremals. Constrained extremisation of functionals-Point constraints-differential equation constraints-isoperimetric constraints.

Variational approach to optimal control problems: Necessary conditions for optimal control -Boundary conditions in optimal control problem. Linear regulator problem. Linear Tracking problem. Pontryagin.s minimum principle- State inequality constraints -Minimum time problems Minimum control effort problems.

Title	Code	Semester/Duration	Credits
Control Systems Analysis	COE513	9/Longitudinal	1,0,3

Introduction to Computer Aided Control System Analysis. Main principles of control: Feedforward and feedback control; advantages and limitations of feedback and feedforward control; structure of feedback systems.

Mathematical preliminaries: Review of LTI systems description in both time and frequency domains; linearization; block diagrams and signal flow graph manipulations

Mathematical modelling: First-principle and phenomenological modeling; models of sensors, actuators, and standard controllers

Stability of control systems: Input-output and internal stability; Routh-Hurwits criterion

Analysis of control systems in the time domain: Steady state response, error coefficients and system type; transient responsecharacteristics; relation between pole/zero configuration and transient response.

Root-locus technique: Rules for root-locus sketching; root contours and applications

Design of control systems in the time domain: Design specifications in the time domain; design of P, PI, PD, and PID controllers; design of lead, lag, and lead-lag compensators

Analysis of control systems in the frequency domain: Characteristics of stationary response in the frequency domain; stabilityanalysis in the frequency domain (Nyquist stability criterion)

Design of control systems in the frequency domain: Design specifications in the frequency domain: design of P, PI, PD, and PID controllers; design of lead, lag, and lead-lag compensators

Title	Code	Semester/Duration	Credits
Graduation Project 1	CPE514	9/Longitudinal	0,0,6

Project work is for duration of two semesters and is expected to be completed in the tenth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. The project work

may be undertaken in electrical power systems / machines / control / electronics / communications / computer / instrumentation / engineering or any allied area and must have relevance in electrical or electronics engineering. Project evaluation committee consisting of the guide and three/four faculty members specialised in the above field shall perform the screening and evaluation of the projects by end of semester ten. Each project group should submit project synopsis within three weeks from start of ninth semester. Project evaluation committeeshall study the feasibility of each project work before giving consent. Literature survey and 30% of the work has to be completed in the ninth semester.

Title	Code	Semester/Duration	Credits
Microcontroller and Embedded Systems	COE521	10/Longitudinal	2,1,2

Introduction to Embedded Systems: Characteristics of Embedded Systems, Microprocessor basics, **Microprocessor architectures**: CISC and RISC- Von Neumann and Harvard- Instruction pipelining, Microcontroller: characteristics, Classification.

Hardware Design(with PIC16F84 example):PIC16F84-Architecture, Instruction set, Programming model, Interfacing with peripherals, Interrupts, Parallel I/O ports-Simple Interfacing, Timers and counters, Watchdog timer, Power supply and reset, Clock oscillator.

Hardware Design: Memory for embedded systems: Introduction, Volatile memories, Non volatile memories, Microcontroller memoryimplementation. DACs-stand alone converter-PWM, Data acquisition systems- Sensors-temperature sensors-light sensors, ADCs.

Buses and Protocols: Processor memory bus- peripheral buses-parallel vs serial buses. Serial communication- types-features-bus arbitration, serial standards and protocols, serial ports.

Software Design: Preliminary programming: Assembly language programming Systematic software: Developing programme structure, Choice between assemblers and high level languages. Operating system concepts: Embedded operating systems, Network operating systems, Layers of an OS, Components of an OS, Kernel, Tasks, Scheduling algorithms, Threads, Interrupt handling, IPC,

Task synchronisation, Semaphores.

Real Time operating System: Real time tasks, Real time systems, Types of real time tasks, Real time operating systems, Real timescheduling algorithms, Rate monotonic algorithm, Earlist deadline fast algorithm, Qualities of a good RTOS.

Title	Code	Semester/Duration	Credits
Digital Control Systems	COE522	10/Longitudinal	2,2,0

Introduction to discrete time control system: Block diagram of a digital control system- Review of z- transforms and inverse z- transforms- solution of difference equations- pulse transfer functionpulse transfer function with dead time- system time response- Realization of pulse

transfer functions (Digital Controllers)- Direct Programming- Standard Programming- Series programming-parallel programming- ladder programming.

Review of stability analysis in z- plane: Jury's stability test -Bilinear transformation and extension of Routh's stability criterion to discrete systems- Transient and Steady state response analysis- transient response specifications- steady state error analysis- effect of sampling period on transient response - frequency response specifications- Nyquist stability criterion in the z- plane- Digital Controllers- PI, PD & PID Controllers- Lag, lead, and lag-lead compensators- Design of lag compensator and lead compensator based on root locus and Bode plot approaches.

State Space analysis of digital control systems: state space representation of discrete time systemstransfer function from state model- Controllable, Observable, Diagonal/ Jordan Canonical forms from transfer function- Solution of linear time invariant discrete time state equationsdiscretization of continuous time space equation- representing state models in DCF/ JCF using transformation matrix.Concept of controllability and observability for a linear time invariant discrete time control system- condition for controllability and observability - state feedback- design via pole placementstate observers- design of full order state observer.

Title	Code	Semester/Duration	Credits
Graduation Project 2	COE524	10/Longitudinal	0,0,12

This project work is the continuation of the project initiated in ninth semester. The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation supervisor through progress seminars and demonstrationsconducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc. There shall be at least an Interim Evaluation and a final evaluation of the project in the 10 th semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation. Each project group should complete the project work in the 10 thsemester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the guide and three/four faculty members specialized in electrical power systems / machines / control / electronics / communications / computer / instrumentation / engineering.

Electives

Title	Code	Semester/Duration	Credits
Non-Linear Control Systems	COE513	9/Longitudinal	2,2,0

Introduction and classical techniques- Characteristics of nonlinear systems - classification of equilibrium points - limit cycles -analysis of systems with piecewise constant inputs using

phase plane analysis. perturbation techniques- periodic orbits -stability of periodic solutions - singular perturbation model - slow and fast manifolds. Stability of Nonlinear Systems - Lyapunov stability - local stability - local linearization and stability in the small- Direct method of Lyapunov - generation of Lyapunov function for linear and nonlinear systems - variable gradient method - Centre manifold theorem - region of attraction - Invariance theorems - Input output stability - L stability - L stability of state models. Feedback Control and Feedback Stabilisation- Analysis of feedback systems- Circle Criterion - Popov Criterion- Concepts of Inverse control-Feedback linearization-Model predictive control-Simultaneous Feedback control- Design via linearization-

stabilization - regulation via intgral control- gain scheduling - Exact Feedback Linearization - Input state linearization - inputoutput linearization - state feedback control - stabilization - tracking - integral control.

Applied Sciences (Power)

Title	Code	Semester/Duration	Credits
Electrical Power Systems	PRE411	7/Longitudinal	

Per unit system, power systems matrices, symmetrical components, study of power systems faults, symmetrical and non-symmetrical short circuit faults, short circuit analysis, function of the Z matrix, choice of circuit breakers, study of load flow (power flow), Guass-Seidal, Newton-Raphson, fast decoupled techniques, optimal load flow, DC load flow.

Title	Code	Semester/Duration	Credits
Thermodynamics	PRE421	8/Longitudinal	2,2,0

Basic concepts and definitions, Processes & Cycles, concept of Thermodynamic Property and definition of State; First Law of Thermodynamics, Work & Heat as energies in transition, Interchange-ability of Energy States, Working Fluids and Steady / Unsteady Flow Energy Equations, Perfect and Real Gases; Second Law of Thermodynamics, Reversible and Irreversible Processes, Entropy & Carnot Efficiency, concept of Available Energy.

Title	Code	Semester/Duration	Credits
Power Plants Engineering	PRE422	8/Longitudinal	2,2,0

Power plant economics and selection: Effect of plant type on costs, rates, fixed elements, energy elements, customer elements and investor's profit; depreciation and replacement, theory of rates. Economics of plant selection, other considerations in plant selection.

Steam power plant: General layout of steam power plant, Power plant boilers including critical and super critical boilers. Fluidized bed boilers, boilers mountings and accessories, Different

systems such as coal handling system, pulverizers and coal burners, combustion system, draft, ash handling system, Dust collection system, Feed water treatment and condenser and cooling towers and cooling ponds, Turbine auxiliary systems such as governing, feed heating, reheating, flange heating and gland leakage. Operation and maintenance of steam power plant, heat balance and efficiency, Site selection of a steam power plant.

Diesel power plant: General layout, Components of Diesel power plant, Performance of diesel power plant, fuel system, lubrication system, air intake and admission system, supercharging system, exhaust system, diesel plant operation and efficiency, heat balance, Site selection of diesel power plant, Comparative study of diesel power plant with steam power plant.

Gas turbine power plant: Layout of gas turbine power plant, Elements of gas turbine power plants, Gas turbine fuels, cogeneration, auxiliary systems such as fuel, controls and lubrication, operation and maintenance, Combined cycle power plants, Site selection of gas turbine power plant.

Nuclear power plant: Principles of nuclear energy, Lay out of nuclear power plant, Basic components of nuclear reactions, nuclear power station, Nuclear waste disposal, Site selection of nuclear power plants.

Hydro electric station Hydrology, Principles of working, applications, site selection, classification and arrangements, hydro-electric plants, run off size of plant and choice of units, operation and maintenance, hydro systems, interconnected systems.

Electrical system: Generators and their cooling, transformers and their cooling. Instrumentation Purpose, classification, selection and application, recorders and their use, listing of various control rooms. Pollution due to power generation.

Title	*Code*	*Semester/Duration*	*Credits*
Power Systems Analysis 1	PRE423	8/Longitudinal	2,2,0

Travelling Waves; Resistive, inductive and capacitive terminations, Bewelly lattice diagram. HVDC: Advantage of D.C transmission over A.C, construction of D.C transmission system, main uses of D.C transmission, economic factors, future prospects, converters & inverters, Control of HVDC and limitations. Thermal Rating of power system equipment, cooling techniques, causes of over voltages & insulation coordination, breakdown mechanism.

Title	*Code*	*Semester/Duration*	*Credits*
Power Systems Protection	PRE511	9/Longitudinal	2,1,2

Power system protection: Protective zones, Relaying elements and quantities.Protective relays, basic requirements and type of protection, phase and amplitude comparator, grading (time & current), classification of Electromagnetic relays, Directional relay, Distant relay, Differential relay, basic aspects of static and digital relays, relay protection scheme for transformer, feeder, generators and motors. Circuit breakers, circuit breaking transients, transient recovery voltage, current chopping and resistance switching, circuit breaker rating, arc and arc extinction, circuit

breaker types, oil circuit breaker, vacuum circuit breaker, air blast circuit breaker, SF6 circuit-breaker and operating mechanism, advantages and disadvantages of different types.

Title	Code	Semester/Duration	Credits
Electrical Machines Dynamics	PRE512	9/Longitudinal	2,2,0

MODELING CONCEPTS: Basic Two-pole machine representation of commutator machines, 3-ph synchronous machine with andwithout damper bars and 3-ph induction machine, Kron's primitive machine-voltage, current and torque equations. Real time model of a two phase induction machine-transformation to obtain constant matrices-thee phase to two phase transformation- powerequivalence.

MODELING OF THREE PHASE INDUCTION MACHINE: Generalized model in arbitrary reference frame- Electromagnetic torque -Derivation of commonly used induction machine models- Stator reference frame model Rotor reference frame model- Synchronously rotating frame model- Equations in flux linkages - per unit model-Dynamic Simulation- Small signal equations of induction machine.

SYMMETRICAL AND UNSYMMETRICAL 2 PHASE INDUCTION MACHINE: Analysis of symmetrical 2 phase induction machine-voltage and torque equations for unsymmetrical 2 phase induction machine voltage and torque equations in stationary referenceframe variables for unsymmetrical 2 phase induction machine-analysis of steady state operation of unsymmetrical 2 phase induction machine- single phase induction motor - Cross field theory of single-phase induction machine.

SYNCHRONOUS MACHINE MODELING: Mathematical model of a sep. excited DC motor-steady state and transient analysis - Transfer function of a sep. excited DC motor - Mathematical model of a DC series motor, shunt motor linearization techniques forsmall perturbations. Synchronous machine inductances - voltage equations in the rotor's DQ0 reference frame-electromagnetictorque-current in terms of linkages.

DYNAMIC ANALYSIS OF SYNCHRONOUS MACHINE: Dynamic performance of synchronous machine, three-phase fault,comparison of actual and approximate transient torque characteristics, Equal area criteria- simulation of three phase synchronous machine - modelling of PMSM.

Title	Code	Semester/Duration	Credits
Power Systems Planning	PRE513	9/Longitudinal	2,2,0

Introduction of power planning, National and Regional Planning, structure of P.S., planning tools Electricity Regulation, Electrical Forecasting, forecasting techniques modeling.Generation planning, Integrated power generation cogeneration/captive power, Power pooling and power trading. Transmission and distribution planning.Power system Economics. Power sector finance, financial planning, private participation Rural Electrification investment, concept of Rational tariffs.

Power supply Reliability, Reliability planning. System operation planning, load management,

load prediction, reactive power balance Online power flow studies, state estimation, computerized management, power system simulator. Computer aided planning, wheeling. Environmental effects, the greenhouse effect Technological impacts. Insulation coordination. Reactive compensation.

Optimal power system expansion planning : Formulation of least cost optimization problem incorporating the capital, Operating and maintenance cost of candidate plants of different types (Thermal, Hydro, Nuclear, Non-conventional etc.) and minimum assured reliability constraint - optimization techniques for solution by programming.

Title	Code	Semester/Duration	Credits
Power Systems Analysis 2	PRE514	9/Longitudinal	2,2,0

Introduction to Computer Aided Power System Analysis, Modelling of Power System Components, formulation and Zbus and Ybus, LU Factorization Algorithm. Introduction to fault analysis and types of faults in power systems, development of different algorithms for analysis of symmetrical and asymmetrical faults using sequence networks, Short Circuit Calculation algorithm. Newton-Raphson Power Flow Algorithm, Decoupled and Fast Decoupled Power Flow Solution Methods, DC Power Flow Algorithm.

Introduction: Load flow analysis - iterative methods of load flow solution; Numerical solution of large sparse systems, State Estimation, least squares estimation - Basic solution and sequential form of solution.

Static state estimation, treatment of bad data, Different load forecasting techniques.

Automatic Generation Control - Single and multi-area systems. Optimal control. Decentralized control. Control of load frequency (LF) controller. Power system optimization, unit commitment, economic despatch. Active and reactive power optimization, Hydro-thermal scheduling.

Real time computer control of Power system, configuration, security, monitoring and state estimation, Economic despatch and LF control.

Title	Code	Semester/Duration	Credits
Computer Aided Power Systems Analysis	PRE514	9/Longitudinal	1,0,3

Introduction to Computer Aided Power System Analysis, Modelling of Power System Components, formulation and Zbus and Ybus, LU Factorization Algorithm. Introduction to fault analysis and types of faults in power systems, development of different algorithms for analysis of symmetrical and asymmetrical faults using sequence networks, Short Circuit Calculation algorithm. Newton-Raphson

Power Flow Algorithm, Decoupled and Fast Decoupled Power Flow Solution Methods, DC Power Flow Algorithm.

Introduction: Load flow analysis - iterative methods of load flow solution; Numerical solution of large sparse systems, State Estimation, least squares estimation - Basic solution and sequen-

tial form of solution. Static state estimation, treatment of bad data, Different load forecasting techniques.

Automatic Generation Control - Single and multi-area systems. Optimal control. Decentralized control. Control of load frequency (LF) controller. Power system optimization, unit commitment, economic despatch. Active and reactive power optimization, Hydro-thermal scheduling.

Real time computer control of Power system, configuration, security, monitoring and state estimation, Economic despatch and LF control. Data Acquisition system; man-machine interface.

Title	Code	Semester/Duration	Credits
Graduation Project 1	PRE515	9/Longitudinal	0,0,6

Project work is for duration of two semesters and is expected to be completed in the tenth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. The project work

may be undertaken in electrical power systems / machines / control / electronics / communications / computer / instrumentation / engineering or any allied area and must have relevance in electrical or electronics engineering. Project evaluation committee consisting of the guide and three/four faculty members specialised in the above field shall perform the screening and evaluation of the projects by end of semester ten.

Title	Code	Semester/Duration	Credits
Power systems dynamics and control	PRE521	10/Longitudinal	2,2,0

Electrical power systems stability, generators modelling, steady steady-state stability, transient stability computer analysis of transient stability, multi-machine stability, effect of control equipments in improving stability.

Automatic Generation Control: Concept of AVR and ALFC Loops, Significance of Double Loop in ALFC; Exciter and VAR Control; Single Area Load Frequency Control; Two Area Load Frequency Control; Frequency Response.

Compensation in Power System: Reactive Power Sensitivity and Voltage Control; Load Compensation with Capacitor Banks; Line Compensation with Reactors; Shunt and Series Compensation; Fixed Series Capacitors; Thyristor Controlled Series Capacitors; Introduction to SVC and STATCOM.

Voltage stability: comparison between angle and voltage stability, reactive power flow and voltage collapse, mathematical formulation of voltage stability, voltage stability analysis (PV and QV curves), Prevention of voltage collapse.

Title	Code	Semester/Duration	Credits
Computer Aided Design of Electrical Machines	PRE522	10/Longitudinal	2,2,0

Industrial standardization. National and international standards, codes and testing laboratories. Manufacturing and operating systems, Design considerations for electrical machines, Properties and applications of materials for magnetic machine insulationsystem and its design considerations, Thermal time constant. Cooling systems of transformers and rotating machines. Duty cycles.Ratings and temperature-rise. Mechanical design considerations. Specific loading and output equations of power transformer and induction motor. Design of transformer or induction motor.Introduction to computer Aided Design (CAD) and, computer aided manufacturing (CAM).

Title	Code	Semester/Duration	Credits
Graduation Project 2	PRE524	10/Longitudinal	0,0,12

This project work is the continuation of the project initiated in ninth semester. The performance of the students in the project workshall be assessed on a continuous basis by the project evaluation supervisor through progress seminars and demonstrationsconducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc. There shall be at least an Interim Evaluation and a final evaluation of the project in the 10 th semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation. Each project group should complete the project work in the 10 th semester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the guide and three/four faculty members specialized in electrical power systems / machines / control / electronics / communications / computer / instrumentation / engineering.

Electives

Title	Code	Semester/Duration	Credits
High Voltage Engineering	PRE525	10/Longitudinal	2,1,2

Breakdown phenomena: Breakdown of Gases: Mechanism of Break down of gases, Charge multiplication, Secondary emission, Townsend Theory, Streamer Theory, Paschen's Law, Determination of Minimum breakdown voltage, Breakdown in non uniform field, Effect of polarity on corona inception and break down voltage.

Partial Discharge: definition and development in solid dielectric.

Break Down of Solids: Intrinsic breakdown, Electromechanical break down, Thermal breakdown, Streamer Breakdown.

Breakdown of Liquid: Intrinsic Break down, Cavitation Theory, Suspended particle Theory.

Breakdown in Vacuum: Non metallic electron emission mechanism, Clump mechanism, Effect of pressure on breakdown voltage.

Generation of High Voltage: Generation of high AC voltages: Testing transformer, Cascaded transformer, Series resonant circuit,single stage and multi stage. Advantages of Series Resonant Circuit in testing of cables. Generation of DC high voltage: Cockcroft Walton doubler and multistage circuit.

Electrostatic generator: Definition of Impulse Voltage as per Indian Standard Specification, Wave front and wave tail time,Generation of Impulse Voltage, Multistage Impulse generator,. triggering of Impulse Generator.

Measurement of High Voltage: Sphere gap voltmeter, AC, DC and impulse high voltage measurement as per Indian Standard Specifications. Resistance and Capacitance Potential dividers, Peak voltmeters for measurement of high AC voltage in conjunction with capacitance dividers. Capacitance Voltage Transformer, Rotating Voltmeter for the measurement of DC high voltage, Electrostatic Voltmeter

Transient in power systems: Lightning Phenomena, Electrification of cloud, Development of Lightning Stroke, lightning induced over voltage, direct stroke, indirect stroke. Protection of Electrical Apparatus against over voltage, Lightning Arrestors, Valve Type, Metal Oxide arresters, Expulsion type. Effect of location of lightning arresters on protection of transformer. Protection of substation, Ground wires. Insulation Co ordination, Basic Insulation level. Basic Impulse level, Switching Impulse level. Volt time characteristics of protectivedevices, Determination of Basic Impulse level of substation equipment.

High Voltage Testing: High Voltage testing, Power frequency withstand, induced over voltage and impulse test on transformers, Power frequency wet withstand test and impulse test on insulators.

Title	*Code*	*Semester/Duration*	*Credits*
Power Generation and Economics	PRE526	PRE526	2,2,0

Renewable and non-renewable energy resources, cost of electrical energy production, power system investment, alternative generating projects, constant load factor method, net effective cost method, economic operation of power systems, distribution of load between units, transmission loss, distribution of load between plants.

Unit Commitment: Constraints in Unit Commitment, Spinning reserve, Thermal unit constraints, Hydro constraints, Must run, Fuel constraints. Unit commitment solution methods. StateEstimation and load forecasting in power system: Introduction, state estimation methods, concept of load forecasting, load forecasting technique and application in power system.

Title	Code	Semester/Duration	Credits
Renewable & Alternative Energy Sources	PRE525	10/Longitudinal	2,1,2

Introduction to Energy sources: Renewable and non-renewable energy sources, energy consumption as a measure of Nation's development; strategy for meeting the future energy requirements Global and National scenarios, Prospects of renewable energysources. Impact of renewable energy generation on environment, Kyoto Protocol.

Solar Energy: Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, Solar air heaters-types, solar driers, storage of solar energy-thermal storage, solar pond, solar water heaters, solar distillation, solar still,

solar cooker, solar heating & cooling of buildings, photo voltaic - solar cells, different types of PV Cells, Mono-poly Crystalline and amorphous Silicon solar cells. Design of PV array. Efficiency and cost of PV systems & its applications. PV hybrid systems.

Wind Energy: Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

Energy from Biomass: Biomass conversion technologies, Biogas generation plants, classification, advantages and disadvantages, constructional details, site selection, digester design consideration, filling a digester for starting, maintaining biogas production, Fuel properties of bio gas, utilization of biogas.

Geothermal Energy: Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in Sudan.

Magneto Hydrodynamic power generation: Principle of MHD power generation, MHD system, Design problems and developments, gas conductivity, materials for MHD generators and future prospects.

Hydrogen Energy: Introduction, Hydrogen Production methods, Hydrogen storage, hydrogen transportation, utilization of hydrogen gas, hydrogen as alternative fuel for vehicles.

Fuel cell: Introduction, Design principle and operation of fuel cell, Types of fuel cells, conversion efficiency of fuel cell, application of fuel cells.

Title	Code	Semester/Duration	Credits
Special Electrical Machines	PRE516	9/Longitudinal	2,2,0

Stepper Motors: Construction of single stack and three stack variable reluctance, permanent magnet and hybrid stepper motors andtheir modes of operation (1-Phase on, 2- Phase on and half step modes)- Torque equation - static and dynamic characteristics-definition and explanation of the terms (step single, resolution, positional error, pull in torque, pull out torque, detent torque, mid frequency resonance, response range, slew range - closed loop control of stepper motors - Microprocessor based control of steppermotor, (block diagram, interface and flow chart of open loop control) - comparison of the above mentioned stepper motors -Applications. Switched Reluctance Motor(SRM) - constructional features- principle of operation-L-ş Profile-constraints on pole arc and

tooth arc- torque equation- characteristics (Rotor position Vs Torque, inductance, flux linkage and current: torque Vs speed) - powerconverter circuits((n+1) switching devices and split link circuits)- sensorless control of SRM- Applications.

Synchronous Reluctance Motors (SyRM): Constructional features, working- Phasor diagram-. Torque equation, Characteristics -constant direct axis current control (block diagram and applications) Permanent Magnet Synchronous Motor(PMSM) constructional features-torque equation-Phasor diagram-circle diagrams- vector control of PMSM(Principle, block diagram and explanation)-Transfer function of PMSM.

Permanent Magnet Brushless DC Motors: Constructional features- electronic commutation -Comparison between mechanical and electronic commutation- analysis of BLDC square wave motor with 180 deg pole arc-self control and DSP based control of BLDC Motor(principle, block diagram, flow chart. AC servomotors-constructional features-working-Analysis based on symmetrical components-transfer function- applications.

Single phase special machines: construction and working of AC series motor, repulsive motor and universal motor-phasor diagrams-applications. Linear induction motors(LIM)- Construction of double sided primary flat, tubular and transverse flux-LIMS- Thrust equation- Performance characteristics(SlipVs ŞPF and thrust)-output equation (no derivation),- choice of specific magnetic and electric loading-applications Linear Synchronous Motor-(LSM) Construction of single sided, double sided and slotlessLSMsApplications Linear Reluctance motor(LRM) Construction and principle of operation of LRM Linear Levitation Machine(LLM) Principle of levitation-construction and working of repulsion type and attraction type LLM. consistency and Munin. Case study-Other consistency models.

CORBA Case Study: Introduction-CORBA RMI-CORBA services.

Applied Sciences (Communications and Networks)

Title	Code	Semester/Duration	Credits
Object Oriented Programming	CNE321	6/Longitudinal	2,1,2

Object oriented Design: Concept of Object oriented programming language, Major and minor elements, Object, Class, relationship among objects, aggregation, links, relationship among classesassociation, aggregation using instantiation, meta-class, grouping constructs.

Object oriented concept: Difference between OOP and other conventional programming, advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism.

Basic concepts of Object oriented programming using Java: Class & Object properties: Basic concepts of Java programming-advantages of Java, bytecode& JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of methodoverloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested and inner classes, basic string handling concepts, -String (discuss char(), compare(), equals(), equalsIgnorecase(), indexOf(), length(), substring(), to-CharArray(),toLowercCase(), tostring(), methods), concept of mutable and immutable string, command line arguments, basics of I/O operations-keyboard input using BufferedReader& Scanner classes.

Reusability properties: Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes, & methods, interfaces. Creation of packages, importing packages, member access for packages.

Exception handling & Multithreading : Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread synchronization, inter thread communication, deadlocks for threads, suspending & resuming threads.

Applet Programming (using swing): Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applet in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocument-Base(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

Title	Code	Semester/Duration	Credits
Digital Communications	CNE322	6/Longitudinal	2,1,2

Analog-to-Digital Conversion: Pulse modulation techniques, Sampling, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Digital **Modulation Techniques**: Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Continuously Variable Slope Delta Modulation, Companding, Noise in Pulse-Code and Delta-Modulation Systems. Binary Phase-Shift Keying, Differential Phase-Shift Keying, Differentially- Encoded PSK (DEPSK), Quadrature Phase-Shift Keying (QPSK), M-ary PSK, Quadrature Amplitude Shift Keying (QASK), Binary Frequency Shift-Keying, Similarity of BFSK and BPSK, M-ary FSK, Minimum Shift Keying (MSK), Duo-binary Encoding.

Mathematical Representation of Noise: Some Sources of Noise, Frequency- Domain Representation of Noise, The Effect ofFiltering on the Probability Density of Gaussian Noise, Spectral Components of Noise Response of a Narrowband Filter to Noise,Effect of a Filter on the Power Spectral Density of Noise, Superposition of Noises, Mixing Involving Noise, Linear Filtering, Noise Bandwidth, Quadrature Components of Noise, Power Spectral Density of n(t) and n(t), Probability Density of n(t), n(t), and their Time Derivatives, Representation of Noise Using Orthonormal Coordinates, Irrelevant Noise Components

Data Transmission: A Base-band Signal Receiver, Probability of Error, The Optimum Filter, White Noise: The Matched Filter, Probability of Error of the Matched Filter, Coherent Reception: Correlation, Phase-Shift Keying, Frequency-Shift Keying, Non-

coherent Detection of FSK, Differential PSK, Four Phase PSK (QPSK), Error Probability for QPSK, Probability of Error of Minimum Shift Keying (MSK), Comparison of Modulation Systems.

Spread Spectrum Modulation: Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division, MultipleAccess (CDMA), Ranging using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation and Characteristics of PN Sequences, Acquisition (Coarse Synchronization) of a FH Signal, Tracking (Fine Synchronization) of a FH Signal, Acquisition (Coarse Synchronization) of a DS Signal, Tracking of a DS Signal.

Title	*Code*	*Semester/Duration*	*Credits*
Computer Networks	CNE411	7/Longitudinal	2,1,2

Introduction: Uses of Computer Networks, Network Structure, Architectures, Services, Standardization, Functions of Various Network Layers, Network examples.

Physical layer: Theoretical Basis for Data Communication, Transmission Media, Analog and Digital Transmission, Transmission and Switching ISDN.

Medium Access Sub-layer: LAN, MAN, Protocol, ALOHA, IEEE Standard for 802 for LANs, Fiber Optic Networks, Satellite Networks.

Data Link layer: Design Issues, Error Detection and Correction, Protocols and their Performance, Specifications and Examples.

Network layers: Design Considerations, Difference between Gateway, Ethernet Switch, Rout-

er, Hub, Repeater, Functions of Router, Congestion Control Internetworking and Examples, Details of IP addressing schemes, TCP/IP Protocol details.

Title	Code	Semester/Duration	Credits
Antennas Systems	CNE412	7/Longitudinal	2,1,2

Radiation and Antennas: Antenna definition, Functions of antennas, Network theorems, Properties of antennas, Antenna parameters, Polarization, Basic antenna elements, Radiation mechanism, Radiation fields of alternating current element, Radiated power and radiation resistance of current element, Radiation, induction and electrostatic fields, Hertzian dipole, Different current

distributions in linear antennas, Radiation from half-wave dipole, Radiation from quarter wave monopole, Radiation characteristics of dipoles.

Analysis of Linear Arrays: Directional characteristics of dipole antennas, Radiation pattern of alternating current element, Radiation pattern expressions of centre-fed vertical dipoles of finite length, Radiation patterns of centre-fed vertical dipoles, Radiation patterns of centrefed horizontal dipoles, Radiation patterns of vertical dipoles, Two-element uniform array, Uniform linear arrays, Field strength of a uniform linear array, First sidelobe ratio (SLR), Broadside and End-fire arrays, Patterns of array of non-isotropic radiators, Multiplication of patterns, Generalized expression for principle of pattern multiplication, Radiation pattern characteristics, Binomial arrays, Effect of earth on vertical patterns, Effect of earth on radiation resistance, Methods of excitation, Impedance matching techniques, Transmission loss between transmitting and receiving antennas - FRIIS formula, Antenna temperature and signal-to-noise ratio.

Array Synthesis: Introduction, Synthesis methods, Fourier transform method, Linear array design by Woodward-lawson method, Dolph-chebychev method (Tschebyscheff distribution), Taylor method, Laplace transform method, Standard amplitude distributions. HF, VHF and UHF Antennas: Introduction, Isotropic radiators, Directional antennas, Omni-directional antennas, Resonant antennas, Non-resonant antennas, LF antennas, Antennas for HF, VHF and UHF, Dipole arrays, Folded dipole, V-Antennas, Inverted V-antennas, Rhombic antenna, Yagi-Uda antenna, Log-periodic antennas, Loop antenna, Helical antenna, Whip antenna, Ferrite rod antenna, Turnstile antennas, Discone antennas, Notch antenna.

Microwave Antennas: Introduction, Rod reflector, Plane reflector, Corner reflector, Parabolic reflector, Types of parabolic reflectors, Feed systems for parabolic reflectors, Shaped beam antennas, Horn antennas, Corrugated horns, Slot antennas, Impedance of a few typical dipoles, Slots in the walls of rectangular waveguides, Babinet's principle, Lens antennas, Microstrip antennas.

Antenna Measurements: Introduction, Drawbacks of measurements of antenna parameters, Methods to overcome drawbacks inmeasurements, Methods for accurate measurements, Measurement ranges, Indoor and outdoor ranges, Antenna impedance measurements, Measurement of radiation resistance, Gain measurements, Measurement of antenna bandwidth,

Directivity measurement, Measurement of sidelobe ratio, Measurement of radiation efficiency, Measurement of antenna aperture efficiency, Measurement of polarization of antenna, Phase measurement.

Title	Code	Semester/Duration	Credits
Software Engineering	CNE413	7/Longitudinal	2,1,2

Overview of system analysis & design: Business system concept, System development life cycle, waterfall model, Spiral Model,Feasibility Analysis, Technical feasibility, Cost benefit Analysis, COCOMO model.

System design: Context diagram and DFD, Problem partitioning, Top down and bottom up design, decision tree, decision table and structured English, Functional Vs object oriented approach.

Testing: Levels of testing, Integration testing, Test case specification, Reliability assessment, Validation & Verification metrics,Monitoring & control.

System project management: Project scheduling, Staffing, software configuration management, Quality assurance, Project monitoring.

Fundamentals of Object oriented design in UML: Static and dynamic models, necessity of modeling, UML diagrams, Class diagrams, Interaction diagrams, Collaboration diagram, Sequence diagram, State chart diagram, Activity diagram, Implementationdiagram.

Title	Code	Semester/Duration	Credits
Computer Networks Engineering	CNE421	8/Longitudinal	2,1,2

Data Communication Concepts and Terminology: Data Representation, Data Transmission, Modes of Data Transmission, Signal Encoding, Frequency Spectrum, Transmission Channel,

Data Communication Transmission Media: Transmission Line Characteristics, Transmission Line Characteristics in Time Domain, Cross talk, Metallic Transmission Media, Optical Fiber Base-band Transmission of Data Signals, Telephone Network, Long Distance Network

Modems and Data Multiplexers: Digital Modulation Methods, Multilevel Modulation, Differential PSK, Standard Modems, Limited Distance Modems and Line Drivers, Group Band Modems, Data Multiplexers, Statistical Time Division Multiplexers

Error Control: Transmission Errors, Coding for Error Detection and Correction, Error Detection Methods, Forward Error Correction Methods, Reverse Error Correction The Physical Layer,

The Data Link Layer: Need for Data Link Control, The Data Link Layer 196, Frame Design Considerations, Flow Control, Data Link Error Control, Data Link Management, HDLC-HIGH-LEVEL DATA LINK CONTROL

The Network Layer: The Sub network Connections, Circuit Switched Sub networks, Store and Forward Data Sub networks, Routing of Data Packets, Internetworking, Purpose of the Network Layer, Title of X.25 Interface, Location of X.25 Interface, Addressing in X.25, Packet Assembler and Disassembler (PAD), Asynchronous Character Mode Terminal PAD

Local Area Networks: LAN Topologies, Media Access Control and Routing, MIEDIA ACCESS CONTROL IN LOCAL AREA NETWORKS, INTERNETWORKING, THE TRANSPORT AND UPPER OSI Layer, The Session Layer, The Presentation Layer, The Application Layer.

Title	Code	Semester/Duration	Credits
Satellite Communications	CNE422	8/Longitudinal	2,0,2

Orbits &Lanunching Methods: Kepler laws - Orbital elements - Orbital perturbations - Apogee perigee heights - Inclines orbits - Sun synchronous orbits - Geo stationary orbits - Limits of visibility - Sun transit outage - polarMount antenna - Antenna Look angles - launching orbits - Low earth orbits - medium orbits - constellation.

Space Link: EIRP - transmission losses - power budget equation - system Noise carrier to Noise ration - Uplink and downlink equations - Input and Output back Off - TWTA - Inter modulation Noise - C/No -G/T measurement.

Space & Earth Segment: Space segment - space subsystems payload - Bus - power supply - attitude control - station keeping - thermal control - TT & C Subsystem - Transponders - Antenna subsystem - Earth segment - cassegrain antenna -Noise temperature - Low Noise Amplifiers - Earth station subsystems -TVRO.

Multiplexing &Mulitple Access: Frequency Division multiplexing FDM/FM/FDMA - Single channel per carrier - MCPC -Combanded FDM/FM/FDMA - Time division multiplexing - T1 carrier - Time Division multiple,Access - Frame Burst structure,Frame efficiency, frame Acquisition and synchronization - SS TDMA - SPADE - Spread spectrum - direct sequence - CDMA.

Satellite Services: INTELSAT - INSAT Series - VSAT - Weather forecasting - Remote sensing - LANDSAT -Satellite Navigation - Mobile satellite Service - Direct to Home.

Title	Code	Semester/Duration	Credits
Multimedia Technology	CNE423	8/Longitudinal	2,1,2

Introduction to Multimedia: Overview, Importance, Components, Uses of multimedia, Future Hypertext and hypermedia, different media and channels and modes of communication.

Multimedia Resources: Data rate, cost effectiveness and production time considerations, Analog and digital representations, Image, Video and Audio Standards, Colour space and models, communication standards - ISDN, ATM.

Equipment and devices: Display screen, storage devices, communication and interactive peripherals.

Text: Attributes and guidelines, Text markup, HTML, models of hypertext document, XML

Digital Graphics: Vector and raster graphics, Graphics file formats, image manipulation.

Audio: Digital audio, MIDI, Processing sound, sampling, compression.

Video: MPEG Compression standards, Compression through Spatial and Temporal Redundancy, interframe and intra-frame Compression.

Animation: Types, techniques, key frame animation, utility, Morphing.

Compression techniques: Lossless and lossy compression, Simple compression techniques Interpolative, Predictive, Transform Coding, Discrete Cosine Transform, Statistical Coding - Huffman encoding. JPEG, MPEG

Design and development of multimedia: Tools to support multimedia development, Authoring Multimedia - different type of authoring environments, Media synchronization, Design process, development team Evaluation and Testing - Gagne events, Project management.

Human Computer Interaction (HCI): Objective, norms and guidelines, Shneiderman's rules for design, Norman's seven stages of action, Interaction Design & Notations - Meta notations and state transition graphs, Screen design norms and guidelines.

Multimedia information management application: Multimedia database and design consideration.

Intellectual property: Foundations of intellectual property, copyrights, issues regarding the use of intellectual property.

Future developments: Virtual reality, newer devices, performance support, knowledge management, interactive interfaces.

Title	*Code*	*Semester/Duration*	*Credits*
Information Theory and Coding	CNE424	8/Longitudinal	2,0,0

Basic concepts of information theory and its measurement, error coding in communication systems. Entropy, zero-memory information source, Markov information source. Adjoin source, language structure. Huffman codes, LZ, arithmetic codes. Introduction to rate distortion theory. Channel coding theorem, channel capacity, Shannon limit.

Block codes: characteristics ofblock codes, non-singular block codes, uniquely decodable codes, instantaneous codes, Kraft"s inequality. Error detection, Burst error detecting and correcting codes, linear block codes, binary cyclic codes, Hamming codes, BCH codes, and Read-Solomon codes, encoding, Syndrome decoding and decoding algorithms. Introduction to convolution codes, code tree, trellis, state diagram, maximum likelihood decoding and the Viterbi algorithm. Trellis-coded modulation andUngerboeck codes. Introduction to Turbo coding. Selection of coding scheme.

Title	Code	Semester/Duration	Credits
Optical Fiber Communications	CNE511	9/Longitudinal	2,0,0

Propagation in Fibers: Elementary discussion of propagation in fibers. Attenuation in Optical Fibers. E M wave propagation in step-Index Fibers. E M wave propagation in graded-Index Fibers.

Optical Fibers and Associated Components: Fiber Properties. Splices, connectors, Couplers, and Gratings.

Transmitting and Receiving Devices: Injection laser Characteristics. LED structures, Characteristics and modulation. Optical Transmitters, Receivers and Fiber-optic Link Design: Concepts of Fiber-Optic Networks and wavelength - Division Multiplexing:

Title	Code	Semester/Duration	Credits
Cellular and Mobile Communications	CNE512	9/Longitudinal	2,1,2

Introduction to Cellular Mobile Systems: A basic Cellular System, Performance Criteria, Uniqueness of Mobile Radio Environment, Operation of Cellular Systems, Planning and Cellular Systems, Analog & Digital Cellular Systems.

Elements of Cellular Radio System Design: General description of the problem, Concept of Frequency Channels, Co-channel interference Reduction factor, Desired C/I from a normal case in an Omnidirectional Antenna system, Cell splitting, consideration ofthe components of Cellular Systems.

Interference: Introduction to Co-channel interference, Real time Co-channel interference, Co-channel measurement, Design of Antenna system, Antenna parameters and their effects, Diversity Receiver, Non Co-channel interference - different types. Cell Coverage for Signal and Traffic: General introduction, Obtaining the Mobile Point - to - Point model, Propagation over water or flat open area, Foliage loss, Propagation in near in distance, Long distance Propagation, Point - to - Point predication model - characteristics, Cell site, Antenna heights and signal coverage cells, Mobile - to - Mobile Propagation.

Cell Size Antennas and Mobile Antennas: Characteristics, Antennas at Cell site, Mobile Antennas.

Frequency Management and Channel Assignment: Frequency management, Fixed Channels assignment, Non Fixed Channel assignment, Traffic and Channel Assignment.

Hand Off, Dropped Calls: Why Hand-Off, Types of Hand-Off and their characteristics, Dropped call rates and their evaluation.

Operational Techniques: Parameters, Coverage hole filter, Leaky feeders, Cell Splitting and small cells, Narrow Beam concept.

Title	Code	Semester/Duration	Credits
Networks Security	CNE513	9/Longitudinal	2,1,0

State-of-the-art computer network security technologies, which are crucial to the success of any electronic commerce systems. The course covers fundamental techniques of cryptography, security threats and their possible countermeasures, secure protocols, and other network security schemes (authentication, key management, firewalls, intrusion detection, etc.).

Title	Code	Semester/Duration	Credits
Graduation Project 1	CNE424	8/Longitudinal	2,0,0

Project work is for duration of two semesters and is expected to be completed in the tenth semester. Each student group consistingof not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. The project work may be undertaken in electrical power systems / machines / control / electronics / communications / computer / instrumentation / engineering or any allied area and must have relevance in electrical or electronics engineering. Project evaluation committee consisting of the guide and three/four faculty members specialised in the above field shall perform the screening and evaluation of the projects by end of semester ten.

Title	Code	Semester/Duration	Credits
Communications Network Management	CNE521	10/Longitudinal	2,1,2

DATA COMMUNICATION AND NETWORK MANAGEMENT OVERVIEW: Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers,

Network Management: Goals, Organization, and Functions, Network and System Management, Network ManagementSystem Platform, Current Status and future of Network Management.

SNMPV1 NETWORK MANAGEMENT MANAGED NETWORK: Organization and Information Models MANAGED NETWORK: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.

SNMPV1 NETWORK MANAGEMENT: Communication and Functional Models, The SNMP Communication Model, Functional model.

SNMP MANAGEMENT: SNMPv2 Major Changes in SNMPv2, SNMPv2 System architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

SNMP MANAGEMENT: RMON : What is Remote Monitoring?, RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON **TELECOMMUNICATIONS MANAGEMENT NETWORK**: Why TMN?, OperationsSystems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management

systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

WEB-BASED MANAGEMENT : NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network, Future Directions.Case Studies.

Title	Code	Semester/Duration	Credits
Distributed Systems	CNE522	10/Longitudinal	2,1,2

Characterization of Distributed Systems: Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental.

Inter process Communication: Introduction-API for Internet protocols-External data representation and marshalling--Client-server communication-Group communication- Case study: Inter process Communication in UNIX.

Distributed Objects and Remote Invocation: Introduction-Communication between distributed objects-Remote procedure calls-Events and notifications-Case study: Java RMI.

Operating System Support: Introduction-OS layer-Protection-Processes and threads- Communication and invocation OS architecture.

Distributed File Systems: Introduction-File service architecture-Case Study: Sun Network File System-Enhancements and further developments.

Name Services: Introduction-Name Services and the Domain Name System-Directory Services-Case Study: Global Name Service.

Time and Global States: Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging.

Coordination and Agreement: Introduction-Distributed mutual exclusion-Elections- Multicast communication-Consensus and related problems.

Distributed Shared Memory: Introduction-Design and implementation issues-Sequential consistency and Ivy case study Release

Title	Code	Semester/Duration	Credits
Communications Systems Analysis	CNE523	10/Longitudinal	1,0,3

Simulation techniques for communication systems operating in random environments. Simulation models for stochastic signals and system components including coders, decoders, modulators, non-linear amplifiers, bit and carrier synchronizers, equalizers and receivers. Techniques for modeling time-varying channels. Monte Carlo simulation, semi-analytic simulation and variance reduction techniques applied to the analysis, design and performance evaluation of communication systems.

Title	Code	Semester/Duration	Credits
Graduation Project 2	CNE524	10/Longitudinal	0,0,12

This project work is the continuation of the project initiated in ninth semester. The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation supervisor through progress seminars and demonstrationsconducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc. There shall be at least an Interim Evaluation and a final evaluation of the project in the 10 th semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation. Each project group should complete the project work in the 10 th semester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the guide and three/four faculty members specialised in electrical power systems / machines / control / electronics / communications / computer / instrumentation /engineering.

Electives

Title	Code	Semester/Duration	Credits
Computer Architecture and Organization	CNE525	10/Longitudinal	2,2,0

Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

Basic Computer Organization: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input - Output and Interrupt, Complete Computer Description.Introduction, General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Programme Control, Reduced Instruction Set Computer (RISC), Stack Organization.

Micro programmed Control: Control Memory, Address Sequencing, Microinstruction Formats, Micro programme Example, Design of Control Unit.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Input - Output Organization: Peripheral Devices, Input - Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct MemoryAccess (DMA), Introduction to Multiprocessor System.

Title	Code	Semester/Duration	Credits
Broadband Wireless Networks	CNE525	10/Longitudinal	2,0,0

WiMAX Genesis and framework 802.16 standard, WiMAX forum, Other 802.16 standards,

Protocol layer topologies - Layers of WiMAX, CS, MAC CPS, Security layer, Phy layer, Reference model, topology. Frequency utilization and system profiles: Cellular concept, Licensed and unlicensed frequencies, Fixed WiMAX system profiles, Mobile WiMAX profiles. WiMAX physical layer: OFDM transmission, SOFDMA, subcarrier permutation, 802.16 transmission chains, Channel coding, Turbo coding,Burst profile. WiMAX MAC and QoS: CS layer, MAC function and frames, Multiple access and burst profile, Uplink bandwidth allocation and request mechanisms, Network entry and QoS management. Radio engineering considerations: Radio resource management, Advance antenna technology in WiMAX, MBS. WiMAX architecture, Mobilityhandover and power save modes, Security.

Title	Code	Semester/Duration	Credits
Grid Computing	CNE525	10/Longitudinal	2,0,0

Grid Computing: Introduction - Definition and Scope of grid computing Grid Computing Initialives: Grid Computing Organizations and their roles - Grid Computing analog - Grid Computing road map. Grid Computing Applications: Merging the Grid sources - Architecture with the Web Devicestechnologies: OGSA - Sample use cases - OGSA platform components - OGSI - OGSA Basic Services. Grid Computing Tool Kits: Globus GT 3 Toolkit - Architecture, Programming model, High level services - OGSI.Net middlewareSolutions.

Title	Code	Semester/Duration	Credits
Network operating systems		10/Longitudinal	2,2,0

Introduction. Operating Systems: Introduction - Overview - Services. Protection: Processes - Programme vs. Process - Representation - Management. Process Coordination: Communication - Synchronization (Semaphores, Message Passing) - Scheduling o Memory Management - Fixed Assignment - Dynamic Assignment - Virtual Memory. Networks and Distributed Systems: Introduction - Benefits - Applications - Network Components - Types of Networks. Communication Basics: Protocols - Communication Software - Communication Hardware / Media - Synchronous vs. Asynchronous - RS-232 Interface. Network and Protocol Architectures: IEEE 802 LAN Standards - LAN Configurations - Ethernet - Token Ring - TCP/IP - OSI - ISDN, ATM. Transmission and Switching: Circuit Switching - Packet Switching. Client-Server Computing: Language Support - Socket Interface - RPC - Web Enabled Applications - Network Security.

Title	Code	Semester/Duration	Credits
network and system Administration		10/Longitudinal	2,0,0

Operating System Installation & Configuration - File System Organization - Network Services (HTTP, LPR, NFS, SMTP, SSH, etc.) - System Support and Maintenance - Application Installation & Configuration - Server Processes - Client Processes - Application Support & Maintenance - Server Administration & Management - User and Group Management - Backup & Disaster Recovery - Security Management - Job Scheduling & Automation - Resource and Site Management - Performance Monitoring - User Support and Education.

Architecture and Building Technology
[B. Sc (honours)]

VISION AND MISSION

The VISION of the department is to provide Excellence in architectural education and apply contemporary design innovations according to international standards of quality in the field of architecture and building technology. The MISSION is to improve the efficiency and effectiveness of architectural education to provide students with knowledge and experience to enable them to design architectural projects with emphasis on local and regional contemporary architectural styles.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of Engineering, has to:

1 Obtain pass mark in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and computer or engineering sciences. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 Achieve the percentage in Sudan School Certificate announced every year (International students may have 10% less in the School Certificate scores.

3 Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of Engineering-.

4 Pay the published fees: 30,000 SDG or US $ 3,500 [international students] (2018).

CAREER ADVICE

Architecture arises from same origins as other universal manifestations of material culture. However, the artifacts designated as architecture possess a scale, permanence and a pervasive influence unique among human endeavors. These qualities give the discipline a cultural prominence that few other professions enjoy. Therefore, the study of architecture is concerned with complex, interdisciplinary issues. Some matters are primarily individual and practical: the basic human need for shelter and the desire to contrive efficient, adequate forms for the patterns of daily life. Architecture also serves a higher purpose, expressing the living values of a culture. It gives form, order and proportion to human activities. The practice of architecture today requires coordinated contributions from a variety of fields. Consequently, the study of architecture at National University, Sudan investigates principles and applications of technology, art, humanities, engineering, physical and social sciences, business and management. The Bachelor of Science degree in Architecture & Building Technology degree is intended for students seeking a professional career in architecture. The curriculum is designed to meet the requirements to prepare the graduate for professional practice. Sudanese and international graduates enjoy the availability of jobs in public and private companies or pursue their own business. They may continue postgraduate education in masters and PhDs to teach in colleges of Architecture.

FACULTY OBJECTIVES

The objectives of the National University Faculty of Engineering -Architecture and Building Technology (ABT) Department are to :

1 Ensure the ability to conceptualize and coordinate designs, addressing social, cultural, environmental and technological aspects of architecture

2 Ensure that graduates possess the ability to recognize the dialectic relationship between people and the built environment in the region

3 Apply and integrate computer technology in design processes and products

4 Utilize cutting edge building technology in design

5. Apply visual and verbal communication skills at various stages of architectural design and project delivery processes

6 Analyze critically building designs and conduct post occupancy evaluation studies

7 Employ architectural research methods including data collection and analysis to assess and propose improvements in existing built environments

8 Work collaboratively with teams of architects and various interdisciplinary design teams involved in the building industry

9 Recognize diversity of needs, values, behavioral norms, social patterns as they relate to the creation of the built environment

Curriculum Objectives [Characteristics of the Architecture and Building Technology graduate

A graduate of the National University- ABT curriculum should be able to:

1 Conceptualize and coordinate designs that address some of the most salient social, cultural, environmental, theoretical, economic, and technological aspects of architecture.

2 Recognize the dialectic relationship between people and the built environment in a region and apply principles of sustainable design.

3 Apply and integrate computer technology in design processes, documentation, and products of complete architectural drawings.

4 Utilize cutting-edge building technology in design and incorporate life safety systems.

5 Build abstract relationships, and to use visual and verbal communication skills throughout the project delivery process.

6 Analyze critically building designs, and to comprehend constructability.

7 Use a variety of analytical research methods when evaluating the building environment.

8 Work collaboratively with various design teams involved in the building industry, and to collaborate and negotiate with clients and consultants.

9 Recognize diversity of needs, values, behavioral norms, and social patterns as they relate to the creation of the building environment.

10 Get involved with designing new buildings, extensions or alterations to existing buildings, or advising on the restoration and conservation of old properties.

11 Work on individual buildings or on large redevelopment schemes, and can be responsible for the design of the surrounding landscape and spaces..

12 Work closely with clients and users to make sure that projected designs match their needs and are functional, safe and economical.

13 Control projects from start to finish and work with a number of construction professionals, including surveyors and engineers, producing drawings and specifications that the construction team works to.

Feedback to students after mid-course and end of course assessment is an essential part of the architecture programme

TIMETABLE

The student has to earn 186 credit hours to obtain a B.Sc. degree in Architecture & Building Science. The study programme for BSc students in the Architecture & Building Science Department is distributed over 10 semesters as follows:

Semester 1 [22 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio I	ARS111	12	-	-	6
2	Islamic Studies I	IST111	2	-	-	2
3	Islamic Studies II	IST121	2	-	-	2
4	Arabic Language I	ARL111	2	-	-	2
5	Arabic Language II	ARL121	2	-	-	2
5	Sudanese Studies I	SDS111	2	-	-	2
5	Sudanese Studies II	SDS121	2	-	-	2
8	English Language I	AR-ENL111	2	-	-	2
8	English Language II	AR-ENL121	2	-	-	2
			28	-	-	22

Semester 2 [20 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio II	ARS121	12	-	-	6
2	History and Theory of Architecture I	ARH111	2	-	-	2
2	History and Theory of Architecture II	ARH121	2	-	-	2
3	Mathematics I	ARM111	3	2	-	2
3	Mathematics II	ARM121	3	2	-	2
4	Computer Studies I	ARC111	3	-	2	3
4	Computer Studies II	ARC121	3	-	2	3
			28	4	4	20

Semester 3 [21 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio III	ARS211	12	-	-	6
2	Construction Technology I	ART211	4	2	-	3
3	Structure I	ARR211	2	-	-	2
4	History and Theory of Architecture III	ARH211	2	-	-	2
5	Environmental Studies I	ARE211	3	-	2	3
6	Building Function I	ARF211	2	-	-	2
7	Computer Studies III	ARC 211	3		2	3
			28	2	4	21

Semester 4 [21 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
2	Construction Technology II	ART221	4	2	-	3
3	Structure II	ARR221	2	-	-	2
4	History And Theory Of Architecture IV	ARH221	2	-	-	2
5	Environmental Studies II	ARE221	3	-	2	3
6	Building Function II	ARF221	2	-	-	2
7	Computer Studies IV	ARC221	3		2	3
			28	2	4	21

Semester 5 [24 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio V	ARS311	16	-	-	12
2	Construction Technology III	ART311	4	2	-	3
3	Structure III	ARR311	4	-	-	3
4	History and Theory of Architecture V	ARH311	2	-	-	2
5	Building Services I	ARB311	2	-	-	2
6	Building Function III	ARF311	2	-	-	2
			30	4	-	24

Semester 6 [26 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio VI	ARS321	16	-	-	12
2	Construction Technology IV	ART321	4	2	-	3
3	Building Services II	ARB321	4	-	-	3
4	Urbanism I	ARU321	2	-	-	2
5	Construction Management I	ARO321	2	-	-	2
6	Building Function IV	ARF321	2	-	-	2
7	Structure IV	ARR321	2	2	-	2
			32	4	-	26

Semester 7 [27 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio VII	ARS411	18	-	-	12
2	Construction Technology V	ART411	4	2	-	2
3	Urbanism II	ARU411	2	-	-	2
4	Construction Management II	ARO411	2	-	-	2
5	Advanced computer studies	ARV411	4	-	-	2
6	Building Function V	ARF411	2	-	-	2
7	Building Services II	ARS411	2	-	-	3
			34	2	-	27

Semester 8 [23 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Design Studio VIII	ARS421	20	-	-	16
2	Construction Technology VI	ART421	4	2	-	3
3	Construction Management III	ARO421	2	-	-	2
4	Building Function VI	ARF421	2	-	-	2
			28	2	-	23

Semester 9 [12 CHs-18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Graduation Project I	ARG511	24	-	-	10
2	Research method	ARR511	2	-	-	2
			26	-	-	12

Semester 10 [10 CHs- 18 weeks]

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Graduation Project II	ARG521	24	-	-	10
			24	-	-	10

Elective courses

	Title	Code	Units			CH
			Th	Tut	Lab	
1	Interior Architecture	ARE1	2	-	-	2
2	History of Art	ARE2	2	-	-	2
3	Furniture Design	ARE3	2	-	-	2
4	Mud Architecture	ARE4	2	-	-	2
5	Landscape Architecture	ARE5	2	-	-	2
			10	-	-	10

COURSE OUTLINES

Title	*Code*	*Semester/Duration*	*Credits*
Mathematics I	ARM111	1/Longitudinal	2,2,0

Architecture and mathematics. General historical review of geometry and arithmetic concepts. Fundamental concept of ratio, Proportions and Shapes.

Title	*Code*	*Semester/Duration*	*Credits*
Mathematics II	ARM121	2/Longitudinal	2,2,0

Architecture and mathematics. Emphasis on geometrical begins with Lines, surfaces, volumes, solids and ends up with an polyhedral.

Title	*Code*	*Semester/Duration*	*Credits*
Environmental Studies I	ARE211	3/Longitudinal	3,2,0

Building physical environment. Definition of climate elements of :heat, Light ….etc. differentiation between the concept of climate and weather. Environmental descriptions. Environmental concerns :Global Warming,Ozone depletion and Environmental treaty and conventions.

Title	*Code*	*Semester/Duration*	*Credits*
Environmental Studies II	ARE221	4/Longitudinal	3,2,0

Thermal behavior of building: environmental and climate analysis. Mitigation and enhancement through design, materials and construction. Ventilation.

Title	Code	Semester/Duration	Credits
Building Services I	ARB311	5/Longitudinal	3,2,0

Water supply and disposal: network, storage, disposal. Sewage disposal system. Disposal. Treatment. Garbage disposal and treatment.

Title	Code	Semester/Duration	Credits
Building Services II	ARB321	6/Longitudinal	3,2,0

Electrical services, supply-distribution -net works & connections, Safety, security provisions-standard, specification. Lighting system, illumination standard, type of lighting system, distribution, installation, decorative, work &security lighting, acoustics noise generation, levels & standard for different activities, installation, space acoustic design.

Title	Code	Semester/Duration	Credits
Construction Management I	ARO321	6/Longitudinal	2,2,0

Organization theory. Management theory. Construction management. Construction contracts. Ruction organization.

Title	Code	Semester/Duration	Credits
Construction Management II	ARO411	7/Longitudinal	2,2,0

Equipment's materials. Staff. Project stand up. Project process. Project close up, Economical building.Health, safety and environmental aspects in construction (HSE). Computer Form Generation: Digital Architecture, Topological, Isomorphic, Animate, Metamorphic, Parametric and Evolutionary Architecture.

Title	Code	Semester/Duration	Credits
Building Services II	ARS411	7/Longitudinal	2,2,0

HVAC+R (Heating,ventilating,air conditioning, refrigeration), fire service,transport building (lift, escalators,travelators construction &power requirements,security system, CCTV systems-monitoring, control. Air condition &treatment ion system. Treatment. Vertical circulation system.

Title	Code	Semester/Duration	Credits
Construction Management III	ARO421	8/Longitudinal	2,2,0

Construction practice Ethical code of practice ion management, bill of quantity, Spec faction, and proficient.

Title	Code	Semester/Duration	Credits
CALCULUS FOR ENGINEERING	MATH-114	1/Longitudinal	3,2,0

This course is designed to provide students with a working knowledge of the elementary physics principles mentioned above, as well as their applications, and to enhance their conceptual understanding of physical laws.

Functions of engineering importance; review of polynomial, exponential, and logarithmic functions; trigonometric functions and identities. Inverse functions (logarithmic and trigonometric). Limits and continuity. Derivatives, rules of differentiation; derivatives of elementary functions. Applications of the derivative, max-min problems, Mean Value Theorem. Antiderivatives, the Riemann definite integral, Fundamental Theorems. Methods of integration, approximation, applications, improper integrals.

Methods of integration: by parts, trigonometric substitutions, partial fractions; engineering applications, approximation of integrals, improper integrals. Linear and separable first order differential equations, applications. Parametric curves and polar coordinates, arc length and area. Infinite sequences and series, convergence tests, power series and applications. Taylor polynomials and series, Taylor's Remainder Theorem, applications.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO ARCHITECTURE	ARCH-115	1/Longitudinal	1,0,0

Overview of the architectural field. Emphasis on tours of architectural Buildings and construction sites. Topics include career paths, educational opportunities and the architect's responsibilities.

Title	Code	Semester/Duration	Credits
FREEHAND ARCHITECTURE DRAWING-I	ARCH-117	1/Longitudinal	0,0,6

Students will acquire skills in freehand drawing through exercises, with special emphasis on understanding the principles of and practising perspective drawing techniques. The course is designed to familiarise students with freehand drawing of 3D objects, the use of basic drawing techniques and methods in order to develop visual abilities and visual expression skills. Additional tasks include exercises designed to develop 3D imaging skills, combination skills and creativity.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL COMPUTER AIDED DRAFTING-I	ARCH-118	1/Longitudinal	1,0,3

Introduction and practical application of Computer-Aided Drafting (CAD) techniques and standards used to create two-dimensional architectural drawings. Focus on hardware and soft-

ware components, operating systems, file management, CAD commands, system variables, drawing setup, creation of lines and shapes, and the editing, saving, and printing of drawings. Advanced topics include external references, layouts, paper space, attributes, dimensioning, text, and the creation of a symbols library.

Title	Code	Semester/Duration	Credits
LINEAR ALGEBRA FOR ENGINEERING	MATH-126	-	2,0,0

Applications. Complex numbers. Linear equations, matrices and determinants. Introduction to vector spaces. Eigenvalues and diagonalization.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL HISTORY	ARCH0-211	3/Longitudinal	2,0,3

Overview of architectural history from prehistory to modern times. 1. Prehistoric architecture. 2. Ancient architecture, (Egyptian, Mesopotamia, Persian, Greek, Roman, and Bezentanian). 3. Medieval architecture (Romanesque and Gothic, Renaissance). 4. The 19th century and the first half of the twenty century in Europe and North America. Identification of architecture styles by their cultural expression of belief systems within the religion and politics of the era. Emphasis on the built environment; attention also given to expression through art.

Title	Code	Semester/Duration	Credits
FREEHAND ARCHITECTURE DRAWING-II	ARCHI-127	2/Longitudinal	0,0,6

Students will acquire skills in freehand drawing through exercises, with special emphasis on understanding the principles of and practising perspective drawing techniques. The course is designed to familiarise students with freehand drawing of 3D objects, the use of basic drawing techniques and methods in order to develop visual abilities and visual expression skills. Additional tasks include exercises designed to develop 3D imaging skills, combination skills and creativity.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL GRAPHICS-I	ARCH-128	2/Longitudinal	1,0,6

Introduction to the various means by which architects have traditionally communicated and presented their buildings. Topics include basic drawing and sketching, model making, and the use of computer software to generate and manipulate presentations. Emphasis on composition, line quality, precision, and clarity of presentation. Introduction to the architectural jury.

Title	Code	Semester/Duration	Credits
BUILDING MATERIALS-I	BS-212		2,0,3

Study of the history, development, and application of residential building materials. Designed

to provide a solid background in the construction and detailing of residential building materials as well as an appreciation for the appropriate use of materials and the field of architecture.

Title	Code	Semester/Duration	Credits
PHYSICS FOR ENGINEERING	PHYS-213	3/Longitudinal	3,0,3

Calculus-based introduction to the basic concepts of fluids and sound, heat, kinetic theory, and entropy, including such topics as: fluid mechanics and motion, sound Waves: speed, harmonic waves, intensity, temperature and heat: thermal expansion, heat capacity, conduction and radiation, kinetic theory of gases: First Law of Thermodynamics, internal energy of a gas, heat capacities, adiabatic expansion, entropy and the Second Law: concept of equilibrium and entropy, heat engines, efficiency of heat engines and refrigerators, introduction to statistical mechanics.

Title	Code	Semester/Duration	Credits
ENGINEERING MECHANICS-STATICS	MATH-214	3/Longitudinal	2,2,0

Vector operations. Equilibrium of a particle. Free body diagram. Moment of forces about a point and about an axis. Equivalent systems. Equilibrium of a rigid body in two and three dimensions. Trusses (method of Joints and sections). Frames and machines. Dry friction.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL COMPUTER AIDED DRAFTING-II	ARCH-215	ARCH-215	2,0,3

Practical application of computer-aided drafting software to produce three-dimensional designs, documentation drawings, and computer-generated renderings.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL GRAPHICS-II	ARCH-215	3/Longitudinal	2,0,3

Practical application of Building Information Modeling (BIM) and 3D design software to produce three-dimensional designs, documentation drawings, and computer-generated renderings.

Title	Code	Semester/Duration	Credits
ELCTIVE- ENGINEERS IN SOCIETY	MISS-217	-	1,0,0

Engineering ethics: meaning of ethics, importance of ethics, principles of ethics, required ethical behaviour, code of engineering ethics, responsibilities of professional engineer, professional behaviour. Basics of law for engineers: introduction to Sudanese legal system, law of contract, industrial law, intellectual property law.etc.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN STUDIO-I	ARCH-221	4/Longitudinal	1,0,6

Design studio with an emphasis on basic design principles. Includes overview of principles and criteria used in the programming, analysis, and design phases for small- and medium-sized projects.

Title	Code	Semester/Duration	Credits
BUILDING MATERIALS-II	BS-222		4+4

Study of the history, development, and application of commercial building materials. Designed to develop a solid background in the construction and detailing of commercial building materials as well as an appreciation for the appropriate use of materials.

Title	Code	Semester/Duration	Credits
STRUCTURAL PRINCIPLES	ARCH-223	4/Longitudinal	3,2,0

Overview of structural principles used in the design of buildings. Study includes the general concepts of static forces and the basic design of wood, masonry, and concrete materials.

Title	Code	Semester/Duration	Credits
DIFFERENTIAL EQUATION	MATH-224	4/Longitudinal	2,2,0

Ordinary differential equation: formation of differential equations; solution of first order differential equations by various methods; solution of differential equation of first order but higher degrees; solution of general linear equations of second and higher orders with constant co-efficient; solution of Euler's homogeneous linear differential equations. Partial differential equation: introduction, linear and non-linear first order differential equations; standard forms; linear equations of higher order; equations of the second order with variable coefficients.

Title	Code	Semester/Duration	Credits
STATISTICS	MATH-316	5/Longitudinal	2,2,0

Statistics: measures of central tendency and standard deviation; moments, skewness and kurtosis; elementary probability theory and discontinuous probability distribution; continuous probability distributions, e.g. normal and exponential distribution.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DETAILING	ARCH-225	4/Longitudinal	2,0,3

Overview of the practice of architectural detailing. Topics include functional principles, standards, constructability, and aesthetics.

Title	Code	Semester/Duration	Credits
ARCH-226	ARCH-226	6/Longitudinal	3,0,0

Worldwide overview of modern architectural history from the mid-nineteenth century to the present. Topics include new processes and cultural phenomena that have occurred as a result of modernization. Emphasis on the influence of new technologies, building materials, globalization, environmentalism, and the economics of energy in shaping societies, environments, and architectural design.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN STUDIO-II	ARCH-311	5/Longitudinal	1,0,6

Design studio focusing on the principles used in the design of building sites. Topics include climate, topography, contour modification, pedestrian and vehicular movement patterns, legal constraints, economic factors, site drawings, site models, and site analysis. Includes development of site designs for small and medium-sized projects.

Title	Code	Semester/Duration	Credits
SUSTAINABILITY BUILDING AND LIVING GREEN	ARCH-312	5/Longitudinal	2,0,3

Overview of the concept of sustainability (holistic living and building design that integrates solar concepts, energy efficiency, and material ecology) and its economic, political, and environmental consequences. Lecture and hands-on application focus on sustainable building practices, including design, specification, construction, lifecycle issues, and LEED certification. Exploration of the historical basis for the ideology of sustainability, its applications in today's society, and the implications of choosing to live a green lifestyle.

Title	Code	Semester/Duration	Credits
WORKING DRAWINGS - RESIDENTIAL	ARCH-313	5/Longitudinal	1,0,6

Practical application of computer-aided drafting techniques and construction theory to prepare residential type working drawings. Course work includes developing a complete set of drawings based on wood construction, using CAD drafting standards, efficient database organization, drawing clarity, thoroughness, and attention to dimensioning, cross-referencing, and plotting.

Introduction to the Codes, standards, specifications, and estimating. Topics covered include the interpretation and utilization of building codes, standards, and regulations; techniques used to estimate building costs; the use of specifications to define and limit materials; fabrication and installation in the construction industry; and specification development as an essential part of the contract document.

Title	Code	Semester/Duration	Credits
SUSTANABLE MATERIALS	3BS-315		3,0,0

Examination of the need, development and application of sustainable building materials, methods, and systems used in both residential and commercial construction. Emphasis on those materials that reduce environmental and energy impact.

Title	Code	Semester/Duration	Credits
MODELING AND ANIMATION	ARCH-317	5/Longitudinal	2,0,3

Introduction to object-driven 3D animated rendering software. Practice includes using various methods to create 2D and 3D objects, manipulating objects, setting lighting conditions, creating materials and animating a scene.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN STUDIO - III	ARCH-321	6/Longitudinal	2,0,3

Design studio with an emphasis on the methodology involved in the design of non-residential buildings and the challenges they present to the environment. Investigation of the problems in creating exterior space. Emphasis on the practice of architectural detailing.

Title	Code	Semester/Duration	Credits
WORKING DRAWINGS- COMMERCIAL	ARCH-322	6/Longitudinal	1,0,6

Theory and laboratory practice in the development of non-residential type working drawings. Emphasis on object-oriented CAD techniques, drafting standards, and theory of commercial construction in the preparation of drawings for a building incorporating masonry construction.

Title	Code	Semester/Duration	Credits
ENVIRONMENTAL SYSTEMS	BS-322	6/Longitudinal	2,0,3

Theory and design of plumbing, heating, air conditioning, lighting, and electrical service systems for residential and commercial buildings. Includes CAD drawing techniques and standards in the development of related drawings.

Title	Code	Semester/Duration	Credits
SUSTAINABLE SITES	BS-323	6/Longitudinal	3,0,0

Theory and application of the development of sustainable sites at scales ranging from the individual plot to a neighborhood, a community, or an urban plan. Emphasis on the integration between a particular site and the greater community. Course work includes development of site plans that incorporate sustainable concepts.

Title	Code	Semester/Duration	Credits
COMPUTER APPLICATIONS FOR CONSTRUCTION	BS-324	6/Longitudinal	2,0,6

Introduction to the use of the microcomputer for construction applications. Basic design, construction estimating, project management, word processing, spreadsheets, database, and construction related business software are used and evaluated. Computer equipment, keyboard, and other related software for the construction field are included.

Title	Code	Semester/Duration	Credits
FORM AND STRUCTURE	ARCH-325	6/Longitudinal	3,2,0

The contents of the course include the relationship between structure, natural environment and architecture by presenting historical background about this relationship. It introduces different structural systems that include the skeleton structures, frames, trusses, cables, tents and pneumatic and smart structures. With emphasis of the role of these structures in composing the form of the building and the ability to integrate different systems such as HVAC, Sanitary and lighting.

Title	Code	Semester/Duration	Credits
ARCHITECHTURAL DESIGN STUDIO-IV	ARCH-411	7/Longitudinal	2,0,3

Design studio with an emphasis on passive design strategies employed to reduce the energy consumption and increase human comfort. Focus on small and medium-sized residential and commercial buildings. Topics include the importance of site and climate conditions, the use of the sun to provide heat and light to indoor environments, the use of natural ventilation, and the impact of passive strategies on building form.

Title	Code	Semester/Duration	Credits
ELECTIVE: HISTORIC PRESERVATION	BS-412		3,0,0

Introduction to the concepts of preservation and adaptive re-use and their importance to sustainable design. Topics include historic materials, construction techniques, building systems, the economics of preservation, forensics, remediation practices, and a review of related legislation, government programmed and resources.

Title	Code	Semester/Duration	Credits
INTRODUCTION TO ELECTRICAL AND MECHANICAL SYSTEM	BS-413	7/Longitudinal	3,0,O

Introduction to the electrical, plumbing and HVAC systems used in residential and light commercial buildings. Emphasis on the advantages and disadvantages of various systems, and

how their design and installation integrates into the management of the building process. Particular attention is given to the contractor's viewpoint and the soliciting and managing of mechanical and electrical sub-contractors.

Title	Code	Semester/Duration	Credits
ADVANCED STRUCTURAL SYSTEMS IN ARCHITECTURE	ARCH-414	7/Longitudinal	3,0,0

1. Introduction defining, structures and its impact on building form. 2. Criteria for selecting the appropriate structural systems to fit architectural design. 3. Simplified analysis of the structural behaviour of the following large span systems: cables, tents, arches, shells, folded plates, 2D and 3D grid structures and tall buildings. 4. Materials and methods of construction.

Title	Code	Semester/Duration	Credits
CONSTRUCTION MATERIALS AND APPLICATIONS-II	BS-414	7/Longitudinal	3,0,0

Study of commercial and residential finish materials and light commercial structural methods, providing the technical knowledge base necessary to manage and direct the building process for light commercial buildings and projects in which sustainability is an integral part. Building types studied include pre-engineered and tilt-up concrete and composite types consisting of masonry, steel, and wood modular systems.

Title	Code	Semester/Duration	Credits
CONSTRUCTION MATERIALS AND APPLICATIONS-II	BS-414	7/Longitudinal	3,0,0

Study of commercial and residential finish materials and light commercial structural methods, providing the technical knowledge base necessary to manage and direct the building process for light commercial buildings and projects in which sustainability is an integral part. Building types studied include pre-engineered and tilt-up concrete and composite types consisting of masonry, steel, and wood modular systems.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN STUDIO-V	ARCH-421	8/Longitudinal	2,0,9

Design studio with an emphasis on the principles and benefits of Building Performance Modeling. Focus on the design and representation of complex, medium-sized commercial projects in varied environmental settings. Topics include the use of Building Information Modeling (BIM) as a design tool to evaluate overall building performance and energy usage. Course work includes design documentation, development of cost estimates, simulation of the construction

sequence, and development of BIM throughout the building's life cycle with an emphasis on the design phase.

Title	Code	Semester/Duration	Credits
ELECTIVE: RENEWABLE ENERGY TECHNOLOGY	BS-422	8/Longitudinal	2,0,0

Overview of renewable energy using sunlight, wind, tides, geothermal, biomass and biofuels. Topics include the relative efficiencies and installation of various energy systems, and a review of public policies, incentives, and grants.

Title	Code	Semester/Duration	Credits
LAND AND PROPERTY DEVELOPMENT	BS-423	8/Longitudinal	1,0,0

Examination of the interrelated parts of the land development process. Topics include market study, financing, site selection and analysis, and environmental regulations affecting land development. Emphasis on managing the process while making sure each essential part is completed to move the project from design to a finished development.

Title	Code	Semester/Duration	Credits
WHOLE BUILDINGS DESIGN	BS-424	8/Longitudinal	2,0,0

Exploration of integrated design approach which includes all building stakeholders during all stages of planning and design in order to achieve high building performance.

Title	Code	Semester/Duration	Credits
ELECTIVE-INTERIOR FINISH AND TRIM	BS-424	-8/Longitudinal	2,0,3

Principles and methods of interior finishing. Includes the installation of interior trim, doors, stair building, and cabinetry. Also included is modern finishing materials: drywall, plaster, tile, paneling, wallpaper, flooring, carpet, and ceiling treatments.

Title	Code	Semester/Duration	Credits
INTERIOR FINISH	ARCH-425	8/Longitudinal	2,0,0

Introduction to the skills and knowledge base needed to effectively finish the interior of a structure. Floor finish techniques include traditional hardwood, floating laminate systems, and ceramic tile installation. Wall finish techniques focus on gypsum board products, wood paneling, and ceramic tile. The application of unitized ceiling finish systems such as suspended ceilings and acoustic tile is covered as well as textured finishes applied over gypsum board products. Applicable IRC code standards for interior finish are studied and applied.

Title	Code	Semester/Duration	Credits
MASONRY PRINCIPLES	BS-426	8/Longitudinal	3,0,3

Introduction to masonry construction materials and methods, with an emphasis on the terms, definitions, and methods of construction practices related to concrete block, brick construction, and thin masonry veneer. Topics also include the different types of mortar mixes and their strengths and uses, reinforcement of masonry walls, masonry cleaning, weather protection for masonry, and estimating supplies and materials.

Title	Code	Semester/Duration	Credits
ROOF FRAMING AND EXTERNIOR FINISHING	ARCH-427	8/Longitudinal	2,0,2

Study of various types of roofs and parts of a roof system, including layout terms, rafter sizes, rafter layout, and the use of a framing square. Emphasis on roof framing principles and application, including gable, hip, and intersection roof designs. Course work includes construction of various roof systems and skill development in the selection and installation of siding and roofing materials, soffit, and fascia.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN STUDIO-VI	ARCH-511	9/Longitudinal	2,0,3

Design studio with emphasis on integrated design approach during all stages of planning and design in order to achieve high building performance. Emphasis on the establishment of benchmarks and the use of computer applications to evaluate the interaction of design decisions. Course work includes case studies of existing buildings and urban context as well as teamwork to design and evaluate medium to large commercial building projects, including structural and environmental systems.

Title	Code	Semester/Duration	Credits
CONSTRUCTION SAFETY AND EQUIPMENT	BS-512	9/Longitudinal	2,0,0

Survey of auxiliary equipment and systems used to perform construction work, focusing on their safe and effective operation. Course work includes erecting various types of scaffold, operating moving equipment, and power generating equipment. Other topics include personal safety issues, issues specific to individual pieces of construction equipment, and OSHA requirements/guidelines specific to the construction industry.

Title	Code	Semester/Duration	Credits
SITE PREPARATION AND LAYOUT	BS-513	-9/Longitudinal	2,0,0

Introduction to site management, site preparation, and layout of structures as it relates to current code and safety standards. Topics covered include the use of the construction instruments for laying out structures, triangle calculations, differential leveling, and erection of batter boards and markers.

Title	Code	Semester/Duration	Credits
CONSTRUCTION MATERIAL AND APPLICATIONS-1	BS-513	-9/Longitudinal	3,0,3

Study of residential building techniques and materials. Topics include specific erection and fabrication techniques, construction materials, as well as their uses and sustainability. Both traditional and prefabricated/ pre-manufactured methods and materials are covered. Course serves as technical knowledge base for those who will manage the residential building process.

Title	Code	Semester/Duration	Credits
RESIDENTIAL REMODELING	ARCH-514	9/Longitudinal	1,0,3

Introduction to planning and implementing a residential remodeling project. Emphasis on the development and presentation of a professional contract through the preparation of drawings, specifications, schedule, and estimates. Additional remodeling-related topics include customer relations, green remodeling and sustainability issues, insurance, bonding, liens, sales and marketing, IRC requirements, hazardous substances, historical district issues, and code inspection sequences. The planned project will be constructed in the lab.

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT-I	ARCH-516	9/Longitudinal	0,0,6

This is the first phase of the capstone project that is a continual project over two semesters, and involves one or more students working as one team tackling different aspects of the architecture engineering works, which may involve research and development work OR design. Students will be assigned a research and development project, and all work conducted during the semester must be compiled in a final report and orally presented to the examining committee at the end of Semister 2.

Title	Code	Semester/Duration	Credits
ARCHITECTURAL DESIGN STUDIO-VII	ARCH-521	10/Longitudinal	2,0,3

Design studio focusing on the knowledge and skills developed in all previous programme courses. Focus on the design of large and tall commercial buildings through all phases of development, including presentation and juried review. Emphasis placed on passive design, sustainable materials, energy efficiency, renewable energy technologies, sustainable rating systems, and the use of building information modeling to analyze, document and present comprehensive building solutions.

Title	Code	Semester/Duration	Credits
BUILDING ECONOMICS FOR ARCHITECTURE	ARCH-522	10/Longitudinal	2,0,0

1. Introduction to building economics and life cycle of building projects. 2. Economic feasibility: preliminary and detailed. 3. Methods of rationalization of building cost: during design contracting and implementation stages. 4. Methods of estimation of building cost. 5. Practical applications and case studies.

Title	Code	Semester/Duration	Credits
GRADUATION PROJECT-II	ARCH-526	10/Longitudinal	0,0,6

This is the implementation phase of the capstone project that is a continual project over two semesters, and involves one or more students working as one team tackling different aspects of the architecture engineering works, which may involve research and development work OR design. Students will be assigned a research and development project, and all work conducted during the semester must be compiled in a final report and orally presented to the examining committee at the end of Semester 2.

Emphasis on benchmarks and using computer applications to evaluate the interaction of design decisions. Course work includes case studies of existing buildings and teamwork to design and evaluate building projects.

Title	Code	Semester/Duration	Credits
ELECTIVE-CONCRETE CONSTRUCTION	BS-515	9/Longitudinal	3,0,3

Principles of concrete design, including water/cement ratios, proportions of ingredients, reinforced concrete, concrete footers and walls, finishing with hand and power trowel equipment, and proper methods of curing and testing concrete..

Title	Code	Semester/Duration	Credits
ELECTIVE- CHEMISTRY FOR ENGINEERING	ENG-000	-	3,0,3

Chemical bonding, properties of matter. Chemical thermodynamics with applications to phase equilibria, aqueous equilibria and electrochemistry. Processes at surfaces.

FACULTY OF

INTERNATIONAL RELATIONS & DIPLOMATIC STUDIES

UNDERGRADUATE & GRADUATE PROSPECTUS

VISION AND MISSION

The VISION of the IRDS is to provide an excellent university education consistent with The National University Mission Statement to be among the first institutions offering this programme. The MISSION is to prepare graduates to perform successfully in the international environment by creating a set of standards, a literature of understanding international politics and behaviour of nations, approaches to foreign policy, diplomatic representation and diplomatic activities.

RATIONALE

The UNDERGRADUATE degrees of IRDS under various terminology is offered in the top 10 ranked universities in the USA, among them are: Harvard, Princeton, Stanford, Columbia, Geprgetown, Yale, Chicago, George Washington universities. This, in addition to hundreds of colleges world-wide listed in Wikipedia under the title: “The list of colleges dedicated to the study of International relations”. Such colleges represent think tank of the countries they are in. Prestigious academicians in this fields offer invaluable advice to policy makers and diplomats all over the world. In countries where conservative evidence-based approaches are deficient, and relations with other countries fluctuant, such think tanks should be built on firm knowledge base and wise choice.

ENTRANCE REQUIREMENTS

A student interested in joining the Faculty of International Relations and Diplomatic Studies, has to:

1 - Obtain pass mark in in seven subjects including: Arabic language, religious studies, English language, mathematics, physics, chemistry and biology or computer sciences, engineering sciences, family sciences, agricultural and animal production or arts or design. International students who have not studied Arabic and religious studies may have more alternative subjects from an approved list of subjects published in the webpage of Ministry of Higher Education.

2 - Achieve the percentage in Sudan School Certificate announced every year (International

students may have % less in the School Certificate scores.

3- Apply electronically though the website of the Admission and Accreditation Office, Ministry of Higher Education, or apply directly in Admission Office in the National University, and pass the health examination, aptitude tests and interview at the Faculty of International and Diplomatic Studies.

4. Pay the published fees: 18,000 SDG or US $ 3,000 [international students] (2018).

CAREER ADVICE

International Relations and Diplomatic Studies track includes all aspects of political science, international politics, modern diplomacy, international security, foreign policy analysis, international economics, international relations, international law, regional integration, international organizations, migration and refugee issues, ethics and religion, conflict resolution, negotiations. All these represent a wide spectrum of career for graduates who may specialize in specific areas.

FACULTY OBJECTIVES

The objectives of the Faculty of IRDS are to:

1. Emphasize values and ethical heritage of the Sudanese Nation in its curriculum, and follow strategies that lead to strengthening these values, as an important component of the university's philosophy and message.
2. Graduate IDS professionals at the entry levels with strong community orientation and ethical components, and self-directed learning capabilities.
3. Contribute to community development through the establishment of a knowledge society that transforms education to sustainable developmental projects, on all aspects of modern diplomacy, international relations and political science, through the following: (a) partnership in designing developmental programmed and plans, and implement whatever is feasible in utilizing the experience of specialists, (b) contribution in continuous education through short and long term courses, to improve efficiency of politicians and diplomats, and (c) provision of essential data and documents to improve quality of performance of all concerned, through partnership with the relevant ministries and organizations.
4. Strengthen research in IDS and related professions, making use of the university's links and available resources.

CURRICULUM OBJECTIVES

[Characteristics of the graduate with Bachelor of IRDS]
A graduate of the faculty of IRDS hould be able to :

1. Adopt the strategies of the University and abide by its objectives and rules stated in its constitution.
2. Observe in his/her practice, the ethical codes of the profession, which agree with the Sudanese values, beliefs and norms, and maintain good and honest peaceful relations with every possible person or entity.

3. Appreciate the value of diversity and multi-ethnicity in solving political and international relations' problems with emphatic, humane and fair practice.
4. Detect and manage problems of diplomacy and international relations, which affect the individuals and groups in the country and the whole country.
5. Integrate basic and applied knowledge and common sense in solving the diplomacy and international relations' problems between individuals, communities and countries.
6. Use scientific knowledge in the interpretation, according to known methods of logical thinking and problem solving.
7. Accepts to work in all settings according to needs, and act to improve the service delivery systems both quantitatively and qualitatively.
8. Encourage community participation and act in recruiting various sectors in defining problems of developmental, administrative origin and planning, and providing suitable solutions, recognizing the community beliefs, ethics, and traditional practices.
9. Adhere to "team approach", acting as an efficient member, and ensuring both effectiveness and homogeneity among the members.
10. Manage a political institution unit or chapter efficiently according to scientific, social, statistical, economic, developmental and legal bases.
11. Continue to consider elements of efficiency, costing and economic implications in his/her diagnostic and interventional choices, particularly in conflict resolution within the country and between countries.
12. Acquire the skills of teaching, learning and communication efficiently to carry out his/her duties in educating others and in winning the confidence of the learners and trainees and their societies.
13. Acquire the skills of self education (self-directed learning), and contribute to availing opportunities for planning and implementing continuous education activities to upgrade his/her own abilities and those of his/ her colleagues in the professional team.
14. Carry out IDS research, alone or with a professional team, using scientific methods known in such activities, involving multidisciplinary groups, and utilizing the experience of national and international organizations and NGOs.
15. Use computer in word processing, statistics and graphics to achieve success in other objectives of his/her career, and skills of computer-assisted presentations.
16. Acquire postgraduate qualification in the discipline of his/her choice, recognizing the needs of the society for certain specialties, particularly alleviation of poverty, sustainable development, conflict resolution, governance, justice, democracy and equity.

Feedback to students after mid-course and end of course assessment is an essential part of the IRDS programme

ECUCATIONAL STRATEGIES AND METHODS

The learning strategies emphasize the following: (1) early acquisition of basic skills, (2) student-centred learning, and maximum student responsibility in the learning process, (3) problem-based and problem-oriented learning, (4) community-oriented and community-based activities, (5) integration of basic and applied knowledge in a multidisciplinary approach, (6) self- and peer education and evaluation, (7) team-work approach, (8) a wide range of electives, (9) continuous evaluation and (10) continuous education.

The Faculty adopts the following methods in the daily programme of activities: (1) problem-based learning (PBL) sessions- one problem/ week at most, (2) seminars and small group discussions -once/ week at least (3) field practice in developmental and political issues in settings and societies not less than 1/5th of the timetable, (4 educational assignments, reports and research activities (as many as the programme would allow- at least one per module), (8) electives -not more than 10% of the curriculum timetable, and (9) graduation project.

CURRICULUM TIMETABLE

University Requirements					
No	Code-see semesters	Course Title			Cr.Hrs
1	IRDS -113	English Language (I)			3
2	IRDS-115	Chosen Language (1)			2
3	IRDS-123	English Language (2)			2
4	IRDS-124	Chosen Language (II)			3
5	IRDS-211	English (III)			2
6	IRDS-212	Chosen Language (III)			3
7	IRDS-221	English Language (IIII)			3
8	IRDS-222	Chosen Language (IIII)			3
9	IRDS-311	English Language (IV)			3
10	IRDS-313	Chosen Language (IV)			3
11	IRDS-321	English Language (V)			3
12	IRDS-323	Chosen Language (V)			3
13	IRDS-411	English Language (VI)			3
14	IRDS-413	Chosen Language (VI)			3
15	IRDS-422	English Language (VII)			3
16	IRDS-424	Chosen Language (VII)			3
17	IRDS-424	English Language (VIII)			3
18	IRDS-426	Chosen Language (VIII)			3
			Total Credit Hours		48

		University Requirements	
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS- 118	Introduction to Political Science	3
2	IRDS- 126	Introduction to Conflict Analysis and Resolution	3
3	IRDS- 127	Introduction to International Relations; Concepts and Theories	3
4	IRDS-214	Public Policy, Processes and Strategies	3
5	IRDS-215	Introduction to Modern Diplomacy	3
6	IRDS-216	International Politics & International Security	3
7	IRDS-217	Introduction to Social Research Methods	3
8	IRDS-223	Strategic Geography and Geopolitics	3
9	IRDS-224	Politics & Government in Sudan	3
10	IRDS-225	International Economic Relations	3
11	IRDS-226	Foreign Policy Analysis	3
12	IRDS-227	International Law	3
13	IRDS-315	International Organizations	3
14	IRDS-317	International Conflict: Theories & Case Studies	3
15	IR-312	International Human Rights Law	3
16	IR-314	Gender And International Relations	3
17	IR-316	International Politics of The Middle East	3
18	IRDS-321	Social Science Qualitative & Quantitative Research Methods	3
19	IRDS-328	International Organizations: The United Nations System	3
20	IR-322	Theory & Politics of Globalization	3
21	IR-324	International Environmental Politics	3
22	IR-326	Contemporary African Politics	3
23	IRDS-416	Theory &Policies of International Development	3
24	IRDS-417	Non-Governmental Organization & International Politics	3
25	IR-417	Water, Cooperation and Conflict: Nile Basin Case Study	3
26	IR-414	Ethnicity and Nationalism in World Politics	3
27	IR-416	Regional Integration	3
28	IRDS-426	International Relations Theory	3
29	IRDS-428	International Migration & Refugee Issues Inter	3
30	IR-421	national Politics of Energy	3
31	IR-423	Ethics, Religion and International Politics	3
32	IR-425	Dissertation	6

		University Requirements	
No	Code	Course Titlew	Cr.Hrs
1	IRDS-117	Introduction to Political Science	3
2	IRDS-126	Introduction to Conflict Analysis and Resolution	3
3	IRDS-127	Introduction to International Relations; Concepts and Theories	3
4	IRDS-223	Strategic Geography and Geopolitics	3
5	IRDS-214	Public Policy, Processes and Strategies	3
6	IRDS-215	Introduction to Modern Diplomacy	3
7	IRDS-216	International Politics & International Security	3
8	IRDS-217	Introduction to Social Research Methods	3
9	IRDS-224	Politics & Government in Sudan	3
10	IRDS-225	International Economic Relations	3
11	IRDS-226	Foreign Policy Analysis	3
12	IRDS-227	International Law	3
13	IRDS-316	International Organizations	3
14	IRDS-317	International Conflict: Theories & Case Studies	3
15	DS-311	Diplomatic History	3
16	DS-313	International Negotiation: Theories And Practice	3
17	DS-311	Diplomacy and International Law	3
18	IRDS-325	Social Science Qualitative & Quantitative Research Methods	3
19	IRDS-327	International Organizations: The United Nations System	3
20	DS-321	Global Governance and Diplomacy	3
21	DS-323	International Crisis Diplomacy	3
22	DS-325	Global Perspectives on Public Diplomacy	3
23	IRDS-415	Theory &Policies of International Development	3
24	IRDS-417	Non-Governmental Organization & International Politics	3
25	DS-411	Theories of Diplomacy	3
26	DS-413	African Diplomacy and Foreign Policy	3
27	DS-415	Foreign Ministry Internship	3
28	IRDS-426	International Relations Theory	3
29	IRDS-427	International Migration & Refugee Issues	3
30	DS-422	International Mediation And Conflict Resolution	3
31	DS-424	Cultural Diplomacy	3
32	DS-426	Dissertation	6

		University Requirements		
No	Code-see semesters	Course Titlew		Cr.Hrs
1	IRDS-111	Islamic Cutler (I)		3
2	IRDS-112	Arabic Language (I)		3
3	IRDS-113	English Language (I)		3
4	IRDS-114	Chosen Language (I)		3
5	IRDS-115	Economic principals		3
6	IRDS-116	Introduction to Sociology		3
7	IRDS-117	Introduction to Political Science		3
			Total Credit Hours	21

		University Requirements	
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-121	Islamic Cutler (II)	3
2	IRDS-122	Arabic Language (II)	3
3	IRDS-123	English Language (II)	3
4	IRDS-124	Chosen Language (II)	3
5	IRDS-125	Introduction to Statistics	3
6	IRDS-126	Introduction to Conflict Analysis and Resolution	3
7	IRDS-127	Introduction to International Relations; Concepts and Theories	3
		Total Credit Hours	21

		University Requirements	
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-211	English Language (III)	3
2	IRDS-212	Chosen Language (III)	3
3	IRDS-213	Sudanese Studies	2
4	IRDS-214	Public Policy, Processes and Strategies	3
5	IRDS-215	Introduction to Modern Diplomacy	3
6	IRDS-216	International Politics & International Security	3
7	IRDS-217	Introduction to Social Research Methods	3
		Total Credit Hours	20

		University Requirements		
No	Code-see semesters	Course Titlew		Cr.Hrs
1	IRDS-221	English Language (IV)		3
2	IRDS-222	Chosen Language (IV)		3
3	IRDS-223	Strategic Geography and Geopolitics		3
4	IRDS-224	Politics & Government in Sudan		3
5	IRDS-225	International Economic Relations		3
6	IRDS-226	Foreign Policy Analysis		3
7	IRDS-227	International Law		3
			Total Credit Hours	21

		University Requirements		
No	Code-see semesters	Course Titlew		Cr.Hrs
1	IRDS-311	English Language (V)		3
2	IRDS-313	Chosen Language (V)		3
3	IRDS-315	International Organizations		3
4	IRDS-317	International Conflict: Theories & Case Studies		3
5	IR-312	International Human Rights Law		3
6	IR-314	Gender And International Relations		3
7	IR-316	International Politics of The Middle East		3
			Total Credit Hours	21

		University Requirements	
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-312	English Language (V)	3
2	IRDS-314	Chosen Language (V)	
3	IRDS-316	International Organizations	3
4	IRDS-318	International Conflict: Theories and Case Studies	3
5	DS-311	Diplomatic History	3
6	DS-313	International Negotiation: Theories And Practice	3
7	DS-315	Diplomacy and International Law	3

University Requirements			
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-321	English Language (VI)	3
2	IRDS-323	Chosen Language (VI)	3
3	IRDS-325	Social Science Qualitative & Quantitative Research Methods	3
4	IRDS-327	International Organizations: The United Nations System	3
5	IR-322	Theory & Politics of Globalization	3
6	IR-324	International Environmental Politics	3
7	IR-326	Contemporary African Politics	3
		Total Credit Hours	21

University Requirements			
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-322	English Language (VI)	3
2	IRDS-324	Chosen Language (VI)	3
3	IRDS-326	Quantitative& Qualitative Methods of Social science	3
4	IRDS-328	International Organizations: The United Nations System	3
5	DS-321	Global Governance and Diplomacy	3
6	DS-323	International Crisis Diplomacy	3
7	DS-325	Global Perspectives on Public Diplomacy	3
		Total Credit Hours	21

University Requirements			
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-411	English Language (VII)	3
2	IRDS-413	Chosen Language (VII)	3
3	IRDS-415	Theory &Policies of International Development	3
4	IRDS-417	Non-Governmental Organization & International Politics	3
5	IR-412	Water, Cooperation and Conflict: Nile Basin Case Study	3
6	IR-414	Ethnicity and Nationalism in World Politics	3
7	IR-416	Regional Integration	3

		University Requirements	
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-412	English Language (VII)	3
2	IRDS-414	Chosen Language (VII)	3
3	IRDS-416	Theory &Policies of International Development	3
4	IRDS-418	Non-Governmental Organization & International Politics	3
5	DS-411	Theories of Diplomacy	3
6	DS-413	African Diplomacy and Foreign Policy	3
7	DS-415	Foreign Ministry Internship	3
		Total Credit Hours	21

		University Requirements		
No	Code-see semesters	Course Titlew		Cr.Hrs
1	IRDS-422	English Language (VIII)		3
2	IRDS-424	Chosen Language (VIII)		3
3	IRDS-426	International Relations Theory		3
4	IRDS-428	International Migration & Refugee Issues		3
5	IR-421	International Politics of Energy		3
6	IR-423	Ethics, Religion and International Politics		3
7	IR-425	Dissertation		3
			Total Credit Hours	21

		University Requirements	
No	Code-see semesters	Course Titlew	Cr.Hrs
1	IRDS-421	English Language (VIII)	3
2	IRDS-423		3
3	IRDS-425		3
4	IRDS-427		3
5	DS-422		3
6	DS-424		3
7	DS-426		3

Semester 1:

Course Title: Introduction to Political Science, Code/CHs: IRDS-117/3

Course objective:

1. To define the boundaries of the field of Political Science;
2. To describe the main subfields of the discipline;
3. To describe the central questions that political scientists investigate related to these fields;
4. To define the basic vocabulary and concepts used by political scientists; and
5. To explain the basic tenets of different political ideologies and how they differ from each other.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction	
W2	Politics and Authority	
W3	The Citizen and Organization of Governments)	
W4	How governments are organized, connected to the people, and exercise power)	
W5	Constitution and fedralisme	
W6	Democracy & Autocracy	
W7	Introduction to Issues and Problems in Political Thought	
W8	Socrates and Plato',	
W9	The Human as 'Political Animal': Aristotle's Critique of Plato	
W10	Machiavelli : The Use of Violence in the Art of Politics	
W11	Politics and Power, Understanding Karl Marx Conceptions of Power	
W12	Politics and Power, Michelle Foucault's Conceptions of Power	
W13	STUDENT PRESENTATIONS	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References

1/ Shively, W. Phillips, 2011, Power and Choice: An Introduction to Political Science, 13th edition, New York: McGraw Hill.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%)

Final Exam 50%

Course Title: Introduction to Conflict Analysis and Resolution, Code/ CHs: IRDS-126/ 3

Course objective:

1/ The course will provide an overview of the field of conflict analysis and resolution research, theory, and practice. The course will prepare participants to think analytically about social conflicts and use various models to understand conflict dynamics, processes, and levels of analysis

2/ Participants will learn to connect particular forms of analysis with the theoretical and world-view assumptions that underpin them. Course participants will critically examine the underlying assumptions of theories of conflict, and their application in resolution.

3/ The class will facilitate the exchange of experience between the participants and instructors through discussions, written assignments, and in-class activities.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction	
W2	Overview of the Field of Conflict Analysis & Resolution	
W3	Exploring and Situating the Field of Conflict Analysis & Resolution	
W4	Conflict Analysis and Conflict Mapping	
W5	Models and Sources of Conflict	
W6	Conflict Strategies & Dynamics of Escalation	
W7	Negotiation Strategies and Processes	
W8	Conflict Resolution Strategies and Roles	
W9	Climate Change and conflict over resources	
W10	Culture and Conflict	
W11	Gender, Power and Conflict Resolution	
W12	Ethics & Reconciliation	
W13	Post Conflict Reconstruction:	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

Reference

1- Augsburger, D. (1992). Conflict Mediation Across Cultures. Pathways and Patterns. Louisville: Westminster/John Prince.

2- Kriesberg, L. (2002) Constructive Conflicts. From Escalation to Resolution. Lanham, MD: Rowman & Littlefield Publishers, Inc, 2nd edition.

3- Lederach, J. P. (1997). Building Peace Sustainable Reconciliation in Divided Societies. Washington, DC: United States Institute for Peace Press

4 - Ramsbotham, O., Woodhouse, T. & Miall, H. (2005) Contemporary Conflict Resolution: The Prevention, Management and Transformation of Deadly Conflicts. Blackwell Publishing Professional; 2nd edition

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester : Credit hrs:

Course Title: Introduction to International Relations ; Concepts and Theories, Code/CHs: IRDS-127/3

Course objective: This course introduces the theoretical study of international relations. Students will learn to perform basic research and analysis through writing and thinking about events in world politics from different perspectives, including realism, liberalism, and feminism. Readings are drawn from historic and contemporary scholars of international relations, cover a wide variety of issues.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction to the course	
W2	Power vs. Principle in International Politics	
	THEORETICAL TRADITIONS (Idealism, REALISM, LIBERALISM, AND CONSTRUCTIVISM)	
W3	Idealism	
W4	Realism and Neorealism	
W5	Liberalism and Neoliberalism	
W6	Constructivism; The Role of Ideas,Norms,and Identity	
W7	Decision Making Approaches	
	INTERNATIONAL INSTITUTIONS	
W8	A study in failure: The League of Nations	
W9	A study in partial success: The United Nations	
W10	A study in success: The European Union	
	POST-COLD WAR THINKING ON INTERNATIONAL RELATIONS	
W11	Globalization	
W12	Clash of Civilizations	
W13	End of History	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

Reference

1- Robert J. Art and Robert Jervis, editors (2007) International Politics: Enduring Concepts and Contemporary Issues. 8th edition. New York, NY: Pearson/Longman

2- Daniel W Drezner (2011) Theories of International Politics and Zombies. Princeton, N.J: Princeton University Press.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 2:

Course Title: Public Policy, Processes and Strategies, Code/CHs: IRDS-214/3

Course objective: 1/ To expand students' knowledge of the policymaking process and strategies for policy change while building analytical, communication and research skills.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction to Public Policy	
W2	Problem Definition (framing) and Agenda Setting	
W3	Overviews and Models of Public Policy	
W4	Tools of Public Policy	
W5	Political Economy and Power Resource Accounts	
W6	Institutions and Public Policy	
W7	Group Presentations ; Case Studies	
W8	Federalism and Public Policy	
W9	Local governance and Public Policy	
W10	Role of Professionals and Practitioners in Policy-making Process	
W11	Paradigms and Transformative Policy Change	
W12	Policy Diffusion, Transfer and Convergence	
W13	Policy-Making in a Global Era	
W14	Case Studies	STUDENT PRESENTATIONS
W15	FINAL EXAM	

Reference

1- James E. Anderson. Public Policymaking. 7th ed. Boston: Houghton Mifflin, 2010
2- Ian Shapiro, Stephen Skowronek and Daniel Galvin, eds. Rethinking Political Institutions: The Art of the State, New York: New York University Press, 2006.
3- Gupta, D.K. (2011). Analyzing Public Policy: Concepts, Tools, and Techniques. 2nd Edition. Washington, DC: CQ Press.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%)

Final Exam 50%

Semester 3 :

Course Title: Introduction to Modern Diplomacy, Code/CHs: IRDS - 215/3

Course objective:

1- Students will acquire a general knowledge of diplomatic organisation and the roles played by diplomats
2- Students will be able to identify the principles of negotiation and reporting and describe how these roles serve the interests of the state
3- Students will be able to provide examples of the various modes of diplomacy and discuss their strengths and weaknesses

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction: the nature of diplomacy	
W2	History of Diplomacy,	
W3	Roles of diplomats (bilateral missions, multilateral institutions, headquarters)	
W4	Crisis Management and Coercive Diplomacy	
W5	Bilateral Diplomacy	
W6	negotiation	(guest lecturer)
W7	Economic/Development and diplomacy	
W8	Summitry	
W9	Mediation	
W10	Public Diplomacy	(guest lecturer)
W11	Diplomacy and Security:	
W12	Issues in Diplomacy: A) Securities of diplomatic facilities; B) Diplomatic asylum; C) Diplomatic immunities	
W13	Fieldtrip to the Foreign Ministry	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

Reference

1- Kissinger, Henry, Diplomacy (London: Simon and Schuster, 1994).

2- Berridge, G.R., and Alan James, A Dictionary of Diplomacy, (London: Palgrave, 2003, 2ndedition).

3- Barston, R.P., Modern Diplomacy, (London: Pearson/Longman, 2006, 3rd edition).

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 3:

Course Title: International Politics and International Security, Code/CHs:IRDS-216/3 Course objective:

This course aims to explore the contemporary evolution of international security as an area of intellectual interest and practical concern. The course interleaves historical examples of challenges to international security with the efforts of practitioners, philosophers, and theorists to understand and explain those challenges.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	On War, I: A Nomenclature of Strategy and Organized Violence	
W2	On War, II: Major Conventional War: WWI in Europe and the Middle East	
W3	On War III: Limited and Unconventional War	
W4	On War IV: War in the Middle East	
W5	Nuclear War	
W6	Fieldtrip	
W7	Extended Discussion: Security, War, Power, and Legitimacy	
W8	Civil War and International Security	
W9	Transnational Terrorism, Old and New	
W10	The Global Environment as a Security Challenge	
W11	Demographics, Plague, and International Security	
W12	Transnational Crime, Old and New	
W13	Emerging Threats to International Security	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

Reference

1- John Dower, War Without Mercy: Race and Power in the Pacific War (New York: Pantheon, 1986

2- Lawrence Freedman, The Evolution of Nuclear Strategy, 3rd Ed (New York: Palgrave Mac-Millan, 2003).

3- Colin Gray, Modern Strategy (New York: Oxford University Press, 1999).

4- Richard A. Matthew, Jon Barnett, Bryan McDonald, and Karen L. O'Brien, Eds., Global EnvironmentalChange and Human Security (Cambridge, MA: MIT Press, 2010).

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 3 :

Course Title: Introduction to Social Research Methods, Code/CHs: IRDS-217/3

Course objective:

understand the origin, development, and nature of science

- discuss and explain the nature of social scientific research
- develop insightful and practical research questions
- understand the elements of research design
- understand the strengths and limitations of various research designs
- understand the collection and analysis of data
- engage in the scientific process by developing a research proposal.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Reasons for Studying Research Methods	
W2	Scientific Inquiry in Social Research	
W3	Logic of Inquiry	
W4	Concepts, Variables, Definitions, Measures	
W5	Ethics in Social Research	
W6	Sampling	
W7	Elements of Research Design	
W8	Experiments	

WEEK	LECTURE TOPIC	NOTICE
W9	Surveys - Questions, Design and Implementation	
W10	Surveys - Questions, Design and Implementation	
W11	Surveys - Questions, Design and Implementation	
W12	Surveys - Questions, Design and Implementation	
W13	Unobtrusive Methods	
W14	Qualitative Research Methods	
W15	FINAL EXAM	

Reference

1- Lisa J. McIntyre, Need to Know: Social Science Research methods,. McGraw Hill, 2005.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 4:

Course Title: Strategic Geography and Geopolitics, Code/CHs: 223/3

Course objective: Upon successful completion of this course the student should demonstrate:

1) Knowledge of the various definitions of Geostrategy and Geopolitics and their implications for the field of International Relations.
2) An understanding of the linkages among International Relations, Political Science, National Security policies, History, Political and Economic Geography, Geopolitics and Geostrategy.
3) Familiarity with theories of the state as a geographical and political unit, such as Geopolitik.
4) An understanding of the elements and nature of power, power analysis, and power projection in world politics, to include not only the traditional nation-state as actor, but also contemporary non-state phenomena such as multinational corporations and the environment as Geostrategic factors.
5) Gain an understanding of the major theoretical perspectives on geopolitics

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction - Geopolitics and Geostrategy	
W2	Alfred Thayer Mahan	
W3	Halford Makinder	
W4	Haushofer and Geopolitics	
W5	Borders	
W6	Critical Geopolitics	
W7	Imperial Geopolitics	
W8	Natural & Man-made Disasters	
W9	Cold War Geopolitics	
W10	Geopolitics in the New World Order	
W11	Post-9/11 Geopolitics	
W12	Economic Geopolitics	
W13	Future of geopolitics?	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

Reference

1- Cohen, Saul B. Geopolitics: The Geography of International Relations.London: Rowman & Littlefield Publishers, Inc., 2009.

2- Friedman, George. The Next 100 Years: A Forecast for the 21st Century. New York, NY: Doubleday, 2009.

3- Gray, Colin S., and Geoffrey Sloan, eds. Geopolitics, Geography, and Strategy. London:Routledge, 1999.

4- Grygiel, Jakub J. Great Powers and Geopolitical Change. Baltimore, MD: Johns Hopkins University Press, 2006.

5- Jackson, Richard, and Neil Howe. The Graying of the Great Powers: Demography and Geopolitics in the

21st Century. Washington, DC: Centre for Strategic & International Studies, 2008

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 4

Course Title: Politics & Government in Sudan, Code/CHs: IRDS-224/3

Course objective: The purpose of this course is to help the students understand Sudan's colonial past, the shaping of the nationalist ideology and the the anti-colonial struggles. The institutions of the state, its policies, and the social and economic structures that obtain today.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	overview of Sudanese politics	
W2	Traditional Politics and Colonial Impact on Sudan	
W3	Post Colonial State; Historical Background. (part I)	
W4	Post Colonial State: (part II)	
W5	Post Colonial State (part III)	(guest lecturer)
W6	Political Parties, Political Institutions	
W7	National Identity and The politics of ethnicity	
W8	Economic Reform and Economic Development	
W9	Disaster in Darfur	
W10	The North-South Peace	(guest lecturer)
W11	Renewed Wars, Old Dilemmas	
W12	Democratic Transition And Civil Society	(guest lecturer)
W13	Sudan in Global Context	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References

1- John Ryle, Justin Willis, Suliman Baldo and Jok Madut Jok (eds.) The Sudan Handbook (Oxford: James Currey, 2011

2- Douglas H. Johnson, The Root Causes of Sudan's Civil Wars (Oxford: James Currey, 2003).

3- Robert Collins, A History of Modern Sudan (Cambridge: Cambridge University Press, 2008)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 4 :

Course Title: International Economic Relations, Code/CHs: IRDS-225/3

Course objective: The goals of the course are: 1) to obtain analytical skills to understand the changing political dynamics of international economic relations; and 2) to develop problem-solving skills to analyze major problems and formulate policy responses to the major issues in the field of international political economy.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Course Overview	
W2	What Is International Political Economy?	
W3	Why Study International Political Economy?	
W4	International Political Economy in Historical Perspective	
W5	Mercantilism and Economic Nationalism	
	PART II: ISSUE AREAS	
W6	International Production and Trade	
W7	Free Trade vs. Protectionism	
W8	International Money and Finance	
W9	The Global Financial Crisis	
	PART III: NORTH AND SOUTH	
W10	Development Strategies	
W11	Multinational Corporations	
W12	Oil and Energy: Dependency and Resource Curses	
W13	Reshaping the Global Economy	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References

1. David N. Balaam and Bradford Dillman, Introduction to International Political Economy, 5th ed. (Boston: Longman, 2010).
2- Thomas Oatley, Debates in International Political Economy (Boston: Longman, 2010).
3- Ha-Joon Chang, Bad Samaritans: The Myth of Free Trade and the Secrete History of Capitalism (New York: Bloomsbury Press, 2008).

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)
Presentations and written summaries (20%)
Mid-term short papers (20%) Final Exam 50%

Semester 4:

Course Title: Foreign Policy Analysis, Code/CHs:IRDS-226/3 Course objective:

1. Students will develop a more thorough understanding of the theoretical literature in foreign policy analysis and evaluation.
2. Students will apply these theories as they explore several foreign policy issue areas through case studies.
3. Students will practice critical thinking and will be expected to express their views in both written exercises and case discussions.
4. Students will develop a familiarity with issues that define the post-Cold War foreign policy agenda for all nations-states and other non-state actors..

Course details:

WEEK	LECTURE TOPIC	NOTICE
	Mapping, Analysis, and Evaluation of Foreign Policy	
W1	Who Makes Foreign Policy?	
W2	History of foreign Policy Analysis and FPA and the major theoretical traditions(1)	
W3	History of foreign Policy Analysis and FPA and the major theoretical traditions(11)	
	Foreign Policy Analysis: middle range theory	
W4	Actors and decision making processes	
W5	Neo- Realism, IR Theory And Foreign Policy Analysis	
	AMERICAN FOREIGN POLICY	
W6	Realism And U.S. Foreign Policy	
W7	Liberalism And Constructivism in U.S. Foreign Policy Analysis	
W8	The Post-Cold War Era,	
WEEK	**LECTURE TOPIC**	**NOTICE**
W9	Foreign Policy And The Decline/Renewal of U.S. Hegmony	
	Case Studies	
W10	EU Foreign Policy	STUDENT PRESENTATIONS
W11	Chinese Foreign Policy	STUDENT PRESENTATIONS
W12	Russian Foreign Policy	STUDENT PRESENTATIONS
W13	Iranian Foreign Policy	STUDENT PRESENTATIONS
W14	Indian Foreign Policy	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- Smith, Hadfield and Dunne, Foreign Policy. Theories, Actors and Cases (Oxford 2008)

2- Neustadt and May, Thinking in Time (Free Press 1988)

3- G. John Ikenberry, et al. The Crisis of American Foreign Policy: Wilsonianism in the Twenty-first

4- Century. Princeton, NJ: Princeton University Press, 2009,

5- Donald M. Snow, United States Foreign Policy: Politics Beyond the Water's Edge. Belmont, CA:Thomson/

Wadsworth, 3rd Edition, 2005

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 4:

Course Title:: International Law, Code/CHs:IRDS-227/3

1 - Course objective: 1/"International Law" is designed to introduce students to the basic subjects and sources of international law, the current state of the international legal order, and the ever-present tension between theory and practice that arises in the application of international law to real-world situations

2- This course will examine the impact of international politics on the nature, evolution and impact of international law and the growing role that international law and international institutions are playing in shaping both international relations and domestic politics.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	International Law and International Relations	
W2	The Scope of International Law - Nature, Subjects and Sources	
W3	The Nation State As a Subject of International Law	
W4	Bases of Jurisdiction	
W5	Beyond The Sovereign's Reach: Sovereign Immunity	
W6	Treaties and Other International Agreements In International Law	
W7	The Individual In The International Legal System	
W8	The Laws of War	
W9	Claims and Conflict in International Law	

WEEK	LECTURE TOPIC	NOTICE
W10	The Growing Law of Individual Responsibility	
W11	The Fragmentation of International Law	(guest lecturer)
W12	International Law and the Democratic Deficit	
W13	International Law, Courts, and Democratic Accountability	
W14	Examining the Tension between Theory and Practice in the Application of International Law	STUDENT PRESENTATIONS:
W15	FINAL EXAM	

References

1- Malanczuk, Peter. Modern Introduction to International Law, seventh 7th Edition. Routledge

2- Malcolm EVANS (ed.), International Law,Oxford University Press, 2nded., 2006

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%)

Final Exam 50%

Semester 5:

Course Title: International Organizations, Code/CHs:IRDS-316/3

Course objective: The goal of this course is that students develop a theoretical as well as practical understanding of international organizations (IOs) and the global problems they attempt to address. Upon completion of the course, students should be able to articulate the leading explanations within political science for why IOs exist, controversies surrounding IOs in the context of international relations theory, why they are thought to help solve global problems, and the major challenges IOs face in meeting their objectives.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Course Introduction: What are international organizations	
W2	The International System and The Problem of Cooperation Under Anarchy	
W3	International Response to Global Problems	
W4	International Organizations in Theory I	
W5	International Organizations in Theory II	

WEEK	LECTURE TOPIC	NOTICE
W6	Regulating International Trade: WTO and IMF	
W7	The United Nations	
W8	Field Trip	
W9	Civil Society and Nongovernmental Organizations	
W10	International Organizations and the Environment	
W11	Security Institutions: NATO	
W12	International Organizations and Development	
W13	Peace, Democracy, and International Organizations	
W14	key challenges of global governance in the 21st century?	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- Paul Diehl and Brian Frederking, Eds. Politics of Global Governance. Fourth Edition. Rienner 2005.

2- Darren Hawkins, David Lake, Daniel Nielson, and Michael Tierney. 2006. Delegation and Agency in International Organizations. Cambridge University Press.

3- Michael Barnett. Eyewitness to Genocide: The United Nations and Rwanda. Cornell University Press. 2003.

4- P.J. Simmons and Chantal de Jonge Ourdraat, eds. Managing Global Issues: Lessons Learned. 2001.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 5:

Course Title: International Conflict: Theories & Case Studies, Code/Hs: IRDS-317/3

Course objective:1/This course introduces students to theories of international conflict, focusing especially on wars between countries. 2/ The primary purpose of this course is to examine the conditions that make for war and peace in world politics, as well as the range of possible solutions that might help to prevent this problem in the future.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction to the Course and the Study of International Conflict	
W2	Conflict Studies and International Relation Theory : An Overview of The field Cause of War	
W3	War As a Result of Human Nature	
W4	War as a Result of Government Type	
W5	Causes of Violent Conflict: The State, Nationalism	
W6	War as a Result of the Structure of the International System: “Realism	
W7	War as a Result of “Honor, Fear, and Interest” (More on Realism)	
W8	The Role of Ideas in International Conflict (Constructivism)	
W9	Rationalist Explanations for War	
W10	The Democratic Peace and Critiques of the Democratic Peace	
W11	Diversionary Theory of War	
W12	International Conflict : Case Studies (1)	STUDENT PRESENTATIONS
W13	International Conflict : Case Studies (11)	STUDENT PRESENTATIONS
W14	International Conflict : Case Studies (111)	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References :

1- Patrick M. Morgan, International Security: Problems and Solutions, 1st ed. Washington, D.C.: CQ Press, 2006.

2- Richard Overy, 1939: Countdown to War. New York: Penguin Books, 2009.

3- Waltz, Kenneth. Man, the State, and War. (2001). Columbia University Press.

4- Paul Lauren, Gordon Craig, and Alexander George. Force and Statecraft: Diplomatic Challenges of Our Time. 5th edition (2014). Oxford University Press.

5- Kagan, Donald. On the Origins of War and the Preservation of Peace. (1995). Anchor Books.

6- Kennedy, Robert. Thirteen Days: A Memoir of the Cuban Missile Crisis. (1999). Norton7- William Zartman,, Peacemaking in International Conflict, US Institute of Peace, 1997.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 5 :

Course Title: International Human Rights Law, Code/CHs: IR-312/3

Course objective: This course is designed to provide a theoretical and analytical overview of major issues in the study and practice of human rights with a mix of international, systems perspectives and domestically-focused research

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Human Rights-Theory	
W2	Human Rights-Philosophical Aspects	
W3	A Historical Analysis of Human Rights Law	
W4	Human Rights Treaties Overview.	
W5	The Role of Customary International Law and Human Rights	
W6	Institutional Structure and Procedures,	
W7	"The Bill of Rights" I The United Nations Human Rights Declaration	
W8	"The Bill of Rights" II The International Covenant on Civil and Political Rights	
W9	"The Bill of Rights" III The International Covenant on Economic and Social Rights.	
W10	The Genocide Convention and the Race Convention	
W11	The Women's Convention	
W12	Human Rights in Crisis and Conflict: The Case of Rwanda	
W13	Assessing Human Rights: Are they Western?	STUDENT PRESENTATIONS
W14	Human Rights Law and Practice: What Are the Other Challenges	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- Fujii, Lee Ann. 2009. Killing Neighbors: Webs of Violence in Rwanda. Ithaca: Cornell University Press.

2- Ignatieff, Michael. 2001. Human Rights as Politics and Idolatry. Ed. Amy Gutmann. Princeton: Princeton University Press

3- Alston, Goodman and Steiner, International Human Rights in Context: Law, Politics, Morals (Oxford University Press: 2007

4- DeLaet, Debra L. 2006. The Global Struggle for Human Rights. Toronto: Thomson Wadsworth.

Assessment: The evaluation of students will be distributed as follows:Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 5:

Course Title: Gender and International Relations, Code/CHs: IR-314/3

Course objective: examine some of the "first generation" literature that has developed feminist critiques of, and feminist perspectives on, various theoretical approaches in the discipline of international relations. Drawing on a variety of feminist perspectives

Course details:

WEEK	LECTURE TOPIC	NOTICE
	CONCEPTUAL AND THEORETICAL ISSUES	
W1	Introduction: What is IR? What is Feminist IR	
W2	Early Debates and Responses	
W3	Feminist Theories and Feminist Epistemologies(I)	
W4	Conversations and Critiques Across Theoretical and Methodological Divides: Gender, Feminism and International Theory	
	GLOBAL GOVERNANCE, GLOBAL ECONOMY AND DEVELOPMENT	
W5	recognizing gender in Contemporary world politics	
W6	Gender, Globalization and the Economy	
W7	Economics, Nationalism, and Consumerism	
W8	Engendering International Organization, Social Movements and Human Rights	
W9	Engendering Economic Development and Globalization	
	THE POLITICS OF WAR, PEACE, AND SECURITY	
W10	Gendering the State and Nation	
W11	Gendered Perspectives on Conflict and Security	
W12	Gendered Perspectives on Peace and Peacebuilding	
W13	Technology, Masculinity, and Violence	
W14	The Future	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- B. Ackerly, M. Stern & J. True eds., Feminist Methodologies for International Relations, Cambridge University Press, 2006.

2- L. Benería, Gender, Development and Globalization: Development as if All People Mattered, Routledge, 2003

1- C. Enloe, Globalization and Militarism: Feminists Make the Link, Rowman and Littlefield, 2007

2- E. Prügl, The Global Construction of Gender: Home-Based Work in the Political Economy of the 20th Century, Columbia University Press, 1999.

3- L. Sjoberg, ed. Gender and International Security: Feminist Perspectives, Routledge, 2010.

4- J. A. Tickner, Gendering World Politics: Issues and Approaches in the Post-Cold War Era,- Columbia University Press, 2001

5- S. Whitworth, Men, Militarism and UN Peacekeeping: A Gendered Analysis, Lynne Rienner, 2004.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: Social Science Qualitative & Quantitative Research Methods, Code/CHs: IRDS-325/3

Course objective: This course is designed to provide a broad introduction to issues of social sciences research methods and design. Consideration is given to both quantitative and qualitative approaches to research, although more emphasis is placed on qualitative methods. After completing this course, the students will be able to:a) conduct a comparative evaluation of quantitative, qualitative, experimental, and survey research methods;b) design research based upon the research question and constraints; c) conduct descriptive and inferential statistical analysis; d) frame survey research questions; e) conduct door-to-door surveys; and f) generate research questions, and use statistical tools learned in the class to answer the questions

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Course Overview; Social Research	
W2	Theory and Paradigm in Social Science Research	
W3	Formulating Research Questions and Testing Hypothesis	
W4	Ways to Choose a Fieldsite/Study Subject & Research Ethics	
W5	Sampling, Measurement, Validity and Reliability	
W6	Case Study and Comparative Research Methods	
W7	The Art of the Interview	
W8	Statistical Analysis - I	
W9	Statistical Analysis - II;	
W10	Statistical Analysis - III	
W11	Survey Research - I	
W12	Survey Research - II;	
W13	Data Analysis and Writing Up	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References:

1- Babbie, Earl. 2004. Practice of Social Research, 10th ed. Belmont, CA: Wadsworth

2- Salkind, Neil. 2004. Statistics for People Who (Think They) Hate Statistics, 2nd Edition. Thousand Oaks, CA: Sage.

3- Bryman, A. 2001. "Asking Questions." In Social Science Research Methods. Oxford: Oxford University Press

WEEK	LECTURE TOPIC	NOTICE
W10	Globalization and the Future of the Middle East	
W11	Arab Spring and Islamism's	
W12	Contemporary Cases	STUDENT PRESENTATIONS
W13	Contemporary Cases	STUDENT PRESENTATIONS
W14	Contemporary Cases	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References :

1- Kamrava, Mehran. 2005. The Modern Middle East: A Political History Since the First World War, Los Angeles: University of California Press

2- Gelvin, James L. 2005. The modern Middle East: A history. New York: Oxford University Press,Smith, Charles. Palestine and Arab Israeli Conflict, Bedford-St. Martin's, 7th edition

3- Esposito, John L. 1998. Islam and politics. 4th ed. Syracuse, N.Y.: Syracuse University Press

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 5:

Course Title: Diplomatic History, Code/CHs: DS-311/3

Course objective: After successfully completing the course, students will be able to: ;

1. Interpret the moral and ethical challenges posed to the conduct of international diplomacyand the use of force since 1815.
2. Developing an understanding of, and familiarity with, the most important themes in diplomatic history:. 3. Strengthen critical thinking, research, and writing skills and develop a keen awareness of how past events influence the present (and future).

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	General introduction to the course,	
W2	Concepts - Diplomatic History, Political History, Diplomacy, Diplomatic Skills, Diplomacy in IR	
W3	The impact of the French Revolution and Napoleonic Wars on European diplomacy	
W4	The Congress of Vienna and the other Congresses	
W5	The Holy Alliance	
W6	The Concert of Europe and the Balance of Power system	
W7	Diplomacy of the War, The First World War and international politics	
W8	WWI and Diplomacy	Documentary and Discussion
W9	The Origins of World War Two and Impact of the war on Europe and the world	
W10	The Second World War and it's Outcome	
W11	Cold War and the World	
W12	End of the Cold War	Documentary and Discussion
W13	STUDENT PRESENTATIONS	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References:

1- Carole K. Fink, Cold War: An International History (Westview Press, 2013)

2- Geir Lundestad, The United States and Western Europe since 1945: From Empire by Invitation to Transatlantic Drift (Oxford U. Press, 2005)

3- Odd Arne Westad, The Global Cold War: Third World Interventions and the Making of Our Times (Cambridge, 2007)

4- Robert Kagan, The World America Made (Vintage, 2013)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 5:

Course Title: International Negotiations: Theories and Practices, Code/CHs:DS-313 Course objective: This course is designed to give students:

1. An understanding of how different factors and contexts can influence the negotiation process and its outcome (such as the nature of the issues, power, ethics, technology, thirdparty intervention, culture, violence);
2. An overview of different actual cases of international negotiation concerning peace and security (broadly defined), and the ability to analyse independently such cases using theories or concepts commonly applied in the field; and
3. A limited hands-on feel for the complexity of conducting international negotiations, using role plays (simulations).

Course details:

WEEK	LECTURE TOPIC	NOTICE
	Overview of Basic Concepts and Actors	
W1	Introduction: International Negotiation in Theory and Practice	
W2	Who Negotiates? New Players in the Old Game	
W3	Obstacles to Negotiation and Negotiation Phases: Prenegotiation and problem-solving, bargaining and post-agreement negotiations	
	The Process and Context of Negotiation	
W4	What Drives the Negotiation Process? Power, interests, and ethics	
W5	The Role of Culture (Professional and Ethnic/National)	
W6	Negotiation in a Regional Context	
W7	Negotiating Intractable Conflicts: Ethnic and Internal Disputes	
W8	Negotiation in the Age of Information and Technology	
W9	Third-Party Mediation and Negotiation I: Types and Roles	
W10	The Role of Violence I: Negotiation in the Midst of Violence	
	Explaining Specific Cases of Negotiations (Bilateral, Regional, Global):	
W11	Case Studies (I)	STUDENT PRESENTATIONS
W12	Case Studies (II)	STUDENT PRESENTATIONS
W13	Case Studies (III)	STUDENT PRESENTATIONS
W14	group simulation	
W15	FINAL EXAM	

References

1- Victor A. Kremenyuk, ed., International Negotiation: Analysis, Approaches, Issues. San Francisco: Jossey-Bass Publishers, 2002 (2nd edition).

2- P. Terrence Hopmann, The Negotiation Process and the Resolution of International Conflicts. Columbia: South Carolina Press, 1996

3- J. William Breslin and Jeffrey Z. Rubin, eds., Negotiation Theory and Practice. Cambridge,, 1991.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 5:

Course Title: Diplomacy and International Law, Code/CHs:DS-315/3

Course objective: The purpose of this course is to introduce students to the integral synergy between diplomacy and international law resting on common political dynamics within international society from their origins to the present.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction	
W2	Origins of International Law and the Professionalization of Diplomacy.	
W3	Diplomatic Theory and International Law 1648-1815	
W4	The 19th Century: Old Diplomacy and New.	
W5	International Law, State Power, and Contemporary Warfare(I)	
W6	International Law, State Power, and Contemporary Warfare(II)	Guest lecture
W7	Immunities in International Law	
W8	Classification of Diplomatic Agents	
W9	Privileges and Immunities of Diplomatic Agents	
W10	Vienna Convention on Diplomatic Relations Articles	
W11	Vienna Convention on Consular Relations	
W12	United Nations Convention on Special Missions	
W13	CLASS PRESENTATIONS	
W14	CLASS PRESENTATIONS	
W15	FINAL EXAM	

References

1- Mortimer Sellers, Republican Principles in International Law, (London, 2006).

2- Karl W. Schweizer and M. Keens-Soper, eds., The Art of Diplomacy, (Lanham, MD,1994).

3- G.R. Berridge etal. Diplomatic Theory from Machiavelli to Kissinger (London, 2001).

4- K. Hamilton and R. Langhorne, The Practice of Diplomacy (London, 1994).

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: International Organizations: The United Nations System, Code/CHs:IRDS-328/3

Course objective: Upon completion of the course, students are expected to demonstrate a fundamental knowledge of the history, structure, and functions of the UN as well as the challenges it faces in the contemporary world politics. Moreover, students are expected to be familiar with central theories of international relations regarding the UN; determine the positions of the United States, People's Republic of China, Russian Federation, France, Great Britain and other world powers towards the role of the United Nations; and, understand the unique position of the UN system in the world politics.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	OVERVIEW OF THE UN SYSTEM AND ITS CHALLENGES, UN CHARTER	
W2	The UN as an International Actor	
W3	League of Nations and UN History	
W4	UN Security Council,General Assembly and Secretary General	
W5	Problems in The Structure and Functions of The UN: Organs and Their Inter-relationship	
W6	Economic and Social Development	
W7	Millennium Development Goals	
W8	Human Security and Environment	
W9	International Terrorism and Weapons of Mass Destruction	
W10	Developments In The Peacemaking Function	
W11	Collective Security. Korea and Iraq. Peacekeeping Operations	STUDENT PRESENTATIONS
W12	Opposing Views on The International Criminal Court	STUDENT PRESENTATIONS
W13	Reforming the UN	
W14	UN in the 21st C: Challenges and Opportunities	
W15	FINAL EXAM	

References

1- Mingst, Karen A., and Margaret P. Karns. The United Nations in the 21st Century. 4th ed.

Boulder, CO: Westview Press, 2012.

2- Chesterman, Simon, ed. Secretary or General? The UN Secretary-General in World Politics. Cambridge, UK: Cambridge University Press, 2007.

3- Fasulo, Linda. An Insider's Guide to the UN. 2nd ed. New Haven and London: Yale University Press, 2009.

4- Weiss, Thomas G. What's Wrong with the United Nations and How to Fix It. 2nd ed. Cambridge, UK: Polity Press, 2012.

5- Ziring, Riggs & Plano, J, The United Nations - International Organisation and World Politics by (2003 or later edition).Orlando: Harcourt College Publishers

6- Weiss, Forsythe, and Coate, Boulder, The United Nations and Changing World Politics,: Westview, 5th ed. 2007

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: Theory & Politics of Globalization, Code/CHs:IR-322/3

Course objective:

1- Students will understand aspects of globalization in depth rather than all of globalization on a surface leveland enhance critical awareness of 'globalization'

2- develop historical thinking and understand the concept of periodization by situating the contemporary postCold War era within longer-term chronological frameworks.

3- Analyze both primary and secondary sources concerning disparate regions and create original arguments about global connections.

4 - Understand flows and circulation of people, ideas, commodities and capital across the globe and evaluate arguments scholars make about these phenomena

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Conceptualizing Globalization in Self and World-Historical Contexts	
W2	Coloniality and the Structures and Processes of Globalization	
W3	Nationalism and Neoliberalism in the Age of Globalization	
W4	The Global Economy: The debate about globalization, poverty and inequality	
W5	GLOBAL INSTITUTIONS AND DEVELOPMENT: Debt, Aid and Aid Effectiveness	
W6	Case Study: Global production and China as world factory	STUDENT PRESENTATIONS

WEEK	LECTURE TOPIC	NOTICE
W7	Global Governance and the State	
W8	Culture and the Political Economy of Globalization	
W9	Transnational Social Movements/Transnational Civil Society	
W10	Case Study: Globalization and social/political movements	STUDENT PRESENTATIONS
W11	Terrorism and the Politics of Empire in the Age of Globalization	
W12	Global Citizenship, Human Rights and Gender	
W13	Multiculturalism, Race, and Globalization Theories	
W14	The Globalization of War and Peace	
W15	FINAL EXAM	

References

1- William Bernstein, A Splendid Exchange: How Trade Shaped the World (Grove, 2009)

2- Tim Wu, The Master Switch: The Rise and Fall of Information Empires (Knopf, 2010)

3- Paul Collier, The Bottom Billion (Oxford University Press, 2007

4- Bhagwati, Jagdish. 2004. In Defense of Globalization. New York, NY: Oxford University Press

5- Thomas Friedman, The World is Flat: A Brief History of the Twenty-First Century (Farrar, Strauss, and Giroux, 2005)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: International Environmental Politics, Code/CHs:IR-324/3

Course objective: This course examines contemporary international environmental problems from theoretical and policy perspectives. What are the causes of environmental problems? What strategies do international actors use to attempt to address these problems, and which are most successful? What are the most pressing problems facing policymakers today? How do environmental issues create other problems in areas such as security and economics? In an attempt to shed light on these questions, this course analyzes structures, agents, and processes affecting international environmental politics in the first part. The second part focuses on examining contemporary issue areas including the use of natural resources, overpopulation, pollution, energy use, global climate change, environmental security, and potential future problems.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Theoretical approaches to human environment Relations	
W2	The Emergence of Global Environmental Politics: Trends, Regimes and Ideas	
W3	Actors in the Environmental Arena (I)	
W4	Actors in the Environmental Arena (II)	
W5	Prospects for International Environmental Diplomacy	
W6	The Science and Politics of Global Climate Change	
W7	International environmental regimes: Formation and Effectiveness	
W8	Global environmental governance and the global commons	
W9	Global Environmental Ethics in an Unequal World	
W10	Population, Biodiversity and Forests	
W11	Waste and Chemical Toxins	
W12	Global environmental change and sustainable development	
W13	ENVIRONMENTAL POLICIES, NATURAL RESOURCE MANAGEMENT AND SUSTAINABLE DEVELOPMENT(I)	STUDENT PRESENTATIONS
W14	ENVIRONMENTAL POLICIES, NATURAL RESOURCE MANAGEMENT AND SUSTAINABLE DEVELOPMENT(II)	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- Pamela Chasek, et al. Global Environmental Politics (4th ed.) Westview Press, 2006.
2- Deane Curtin, Environmental Ethics for a Postcolonial World (Rowman & Littlefield, 2005).
3- Thomas Homer-Dixon, The Upside of Down (Island Press, 2008).
4- Gay Hawkins, The Ethics of Waste (Rowman & Littlefield, 2006)
5- Ramachandra Guha, Environmentalism: A Global History (Longman, 2000).
6- Ken Conca and Geoffrey Dabelko (eds.), Green Planet Blues: Environmental Politics from Stockholm to Johannesburg, Third Edition (Westview Press, 2004). [GPB]
7- Gus Speth and Peter Haas, Global Environmental Governance (Island Press, 2006). [GGG]
8- Tom Athanasiou and Paul Baer, Dead Heat: Global Justice and Global Warming (Seven Stories, 2002).
9- Elizabeth Desombre, The Global Environment in World Politics (Continuum, 2002).

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: Contemporary African Politics, Code/CHs: IR-326/3

Course objective: This course offers an in depth intoduction to contemporary African politics. The goal is to introduce students to the most pressing problems African countries have faced since independence. Questions motivating the course include: (1) Why state institutions weaker in African than in other developing regions? (2) What explains Africa's slow economic growth? (3) What can be done to improve political accountability on the continent? (4) Why have some African countries been plagued by high levels of political violence while others have not.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction to African Politics: Pre-Colonial Politics	
W2	The Slave Trade and European Rule in Africa	
W3	Nationalism and Independence	
W4	Legacies of Colonial Rule	
W5	The State in Contemporary Africa	
W6	Race, Ethnicity and Politics	
W7	Religion and Politics	
W8	Political Regimes and Political Change	
W9	Patronage Politics and the African Voter	
W10	Africa's "Growth Tragedy"	
	Civil War and Violence in Africa	
W11	Causes of Civil War	CLASS PRESENTATIONS
W12	Fear and Greed in Civil Wars : Case of Liberia	CLASS PRESENTATIONS
W13	Civil War and Genocide in Rwanda	CLASS PRESENTATIONS
W14	Humanitarian Intervention	CLASS PRESENTATIONS
W15	FINAL EXAM	

References

1- Naomi Chazan (ed.), Politics and Society in Contemporary Africa. Boulder, CO: Lynne Rienner Publishers,

2- Mamdani, Mahmood. 1996. Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism. Princeton: Princeton University Press

3- Young, Crawford. 1994. The African Colonial State in Comparative Perspective. New Haven: Yale University Press

4- Hyden, Goran. 2006. African Politics in Comparative Perspective. Cambridge: Cambridge University Press.

5- Widener, Jennifer. 1994. Economic Change and Political Liberalization in Sub-Saharan Africa. Baltimore:

Johns Hopkins University Press

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title Diplomacy and Global Governance, Code/CHs: DS-321

Course objective: This course examines global governance as both a paradigm that can be used to understand the increasing role of international law, regimes, institutions, and non-governmental organizations in international politics and as an emergent subfield in international relations that studies those topics

By the end of the course, students should:

1. Understand how the major theories of international relations address the issue of global governance
2. Understand the sources of and role played by norms and international law in global governance3. Know the structure, operation, and membership of the leading bodies of global Governance

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction: What Does Global Governance Mean?	
W2	Theoretical Basis of International Order, Cooperation, and Institutions	
W3	Structure, Sovereignty, and the International System	
W4	Liberalism and Neo-Functionalism	
W5	Theories of Hegemony and Neo-Liberalism	
W6	The English School and Constructivist Approaches	
W7	The Realist Critiques of the Prospects of Global Governance	
W8	The Form, Function, and Evolution of Global Governance	
W9	International Law, Norms, and Global Governance	
W10	Mechanisms of Global Governance	
W11	The Design, Formation, and Death of Bodies of Global Governance	

WEEK	LECTURE TOPIC	NOTICE
W12	The Role and Function of Bodies of Global Governance	
W13	Diplomacy and Global Governance	CLASS PRESENTATIONS
W14	Diplomacy and Global Governance	CLASS PRESENTATIONS
W15	FINAL EXAM	

References :

1- Michael Barnett and Martha Finnemore. 2004. Rules for the World: International Organizations in Global Politics. Ithaca: Cornell University Press.

2- Robert Keohane. 1984. After Hegemony: Cooperation and Discord in the World Political Economy. Princeton: Princeton University Press.

3- Ngaire Woods. 2007. The Globalizers: The IMF, the World Bank, and Their Borrowers. Ithaca:Cornell University Press.

4- Margaret Karns and Karen Mingst. 2009. International Organizations: The Politics and Processes of Global Governance, 2 Edition. Boulder: Lynne Rienner.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: International Crisis Diplomacy, Code/CHs: DS-323

Course objective: This course provides an overview of the factors that influence state behaviour during international crises. Considerable attention will be paid to the role of information and credibility in successfully resolving potentially explosive international situations. The module will examine state bargaining behaviour during crises and discuss how the dynamics of international crises undermine decision-making. The module will also examine the efficacy of differing approaches to coercion ranging from threats to military strikes. Finally the module will apply these different theoretical approaches to current international confrontations.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction and Foundations for Analyzing International Crisis Behaviour	
W2	International Crisis Bargaining and Diplomacy	
W3	International Diplomacy: Crisis Behaviour and Signaling Between Rivals	

WEEK	LECTURE TOPIC	NOTICE
W4	Crises in international politics	
W5	Coercion and Crises	
W6	International Interventions Work? Peace building in Practice	
W7	Humanitarian Crisis and the Foundations of Humanitarianism	
W8	Military Intervention in Humanitarian Crises	
W9	Conflict As a Backdrop for Aid	
W10	Humanitarianism and The Neutrality Principle	
W11	Sanctions and Smart Sanctions: Carrots or Sticks?	
W12	Crisis decision-making I. Rational and Non-Rational Models	
W13	Case Studies North Korea	STUDENT PRESENTATIONS
W14	Case Studies :Iran	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References:

1- Blanchard, Jean-Marc F., Edward D. Mansfield, Norrin M. Ripsman. eds. 2000. The Power and the Purse: Economic Statecraft, Interdependence and National Security. London: Frank Cass Publications.

2- Schultz, Kenneth A. 2001. Democracy and Coercive Diplomacy. Cambridge: Cambridge University Press

3- Anderson, Mary: Do No Harm: How Aid Can Support Peace-or War (Lynne Rienner, 1999)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 6:

Course Title: Global Perspectives on Public Diplomacy, Code/CHs: DS-325/3 Course objective:

1 - To understand the theoretical and historical justifications for public diplomacy programmed across national contexts

2 - To comprehend the influence of the media environment and information technology on public diplomacy and strategic communication initiatives

3 - To enable the student to contribute to the ongoing public discussion about public diplomacy, and to be able to critically assess a policy or initiative related to public diplomacy.

4 - To be able to make constructive and critical policy arguments in a public venue -including online, classroom, and simulated public fora.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	From Propaganda to Public Diplomacy	
W2	Conceptualizing Public Diplomacy	
W3	The Dimensions of Soft Power	
W4	Strategic Influence	
W5	Rethinking Public Diplomacy: Messages, Audiences, and Practice	
W6	The Context of Global Media and Global Influence	
W7	Journalism, Media, and Public Diplomacy	
W8	Nation Branding, Message Management, & Strategic Communication	
W9	Leveraging Assets: Extremist organizations, Small States, and Business	
W10	CASE STUDY - China: Behind the Charm Offensive	
W11	CASE STUDY - Japan: Building Cultural Soft Power?	
W12	CLASS PRESENTATIONS	
W13	CLASS PRESENTATIONS	
W14	CLASS PRESENTATIONS	
W15	FINAL EXAM	

References

1- Berenskoetter, Felix, James C. 1990. Dominiation and the Arts of Resistance: Hidden Transcripts. New Haven: Yale University Press.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 7:

Course Title: Theory & Policies of International Development, Code/CHs: IRDS-415/3

Course objective: The course will cover the history and theory of international development, how this influences development policy and practice, the organizations involved in development and the impacts of different approaches. At the end of the course, students will have a clear grasp of:

The contested notion of ‘development’

The key arguments and criticism of these theories

How theories are shaped by historical context, that is, how shifting power relations at the local, national and global levels have affected the creation and promulgation of development theories

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	The Politics of Development II: Constructing the *Development 'Problem'	
	Theories of International Development	
W2	Development and modernization	
W3	Development and dependency	
W4	The neoliberal proposal	
W5	Development and Environment	
W6	The feminist approach	
	International Development Issues in Africa	
W7	Famine, Hunger and Politics	
W8	Corruption	
W9	Partnerships, Civil Society & Power	
W10	The politics of HIV/AIDS	
W11	The Resource Curse	
W12	Failed States and Development	
W13	Security, Conflict and Development	Student presentations
W14	A Chinese 'Development Model' for Africa?	Student presentations
W15	FINAL EXAM	

References

1- Haslam, P. A., J. Schafer, et al., Eds. (2012). Introduction to international development: Approaches actors and issues. Second edition. Don Mills Ontario, Oxford University Press

2- Duffield, M. 2001 Global Governance and the New Wars. The Merging of Development and Security (Zed Books

3- Duffield, M. 2007 Development, Security and Unending War: Governing the World of Peoples (Polity).

4- Taylor, I. 2006 China and Africa: Engagement and Compromise (Routledge)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 7:

Course Title: Non-Governmental Organizations in World Politics, Code/CHs: IRDS-418/3

Course objective: This course helps students critically explore the roles and diplomatic relationships between established major players in the international system (such as sovereign states and international governmental organizations) and a wide range of new and emerging players (such as transnational non-state actors, including nongovernmental organizations). Students will enhance their knowledge and understanding of the historical, theoretical, and current policy roles of, and relationship between, these entities.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Non-governmental organizations: Evolution, organizational dynamic	
W2	Ngos as diplomatic actors	
W3	Traditional non-state actors: the international red Cross (icrc),	
W4	Ngos politics, global governance, and world order	
W5	Role of transnational peace movements and Organizations in ending the cold war in europe and apartheid in south africa	
W6	Campaigns against nuclear weapons, the landmines, [the Small arms trade	
W7	Privatizing foreign policy: private military	
W8	Contractors and lobbying firms	
W9	Peacekeeping, humanitarian emergencies,	
W10	The development tasks of ngos	
W11	Influential individuals: eminent political figures, Celebrity diplomats	
W12	Insidious non-state actors: crime, corruption, terorism, & piracy	
W13	Virtual states, sub-states, cities, regions, social Networks	
W14	Case studies	Student Presentations
W15	Final exam	

References

1- Joshua W. Busby (2010) Moral Movements and Foreign Policy, Cambridge: Cambridge University Press.

2- Sidney Tarrow (2005) The New Transnational Activism, Cambridge: Cambridge University Press.

3- Peter Willetts (2011) Non-Governmental Organizations in World Politics: The Construction of Global Governance, London and New York: Routledge.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 7:

Course Title: Water, Cooperation and Conflict: Nile Basin Case Study, Code/Chs: IR-412/3

Course objective: Student learning will be achieved in the following specific areas in this course:

1- Identification of specific cases of water conflict and types of agreements and cooperative frameworks devised for managing them (including a focused exploration of the Nile Basin)

2- Understanding of the basis for predictions that have been made about the future of water management from a variety of disciplinary perspectives;

3- Evaluation of various explanations for conflict and cooperation pertaining to water resources.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Water and resource conflict theories(I)	
W2	Water and resource conflict theories(II)	
W3	Water and scarcity: definitions and dimensions of scarcity and depletion	
W4	The role of water in development	
W5	Economic perspectives	
W6	Water and security	
W7	International legal frameworks for dealing with water and institutional perspectives	
W8	Nile Case study I	
	Nile Case study II	
	Nile Case study III	Guest lecture

WEEK	LECTURE TOPIC	NOTICE
	Nile Case study IV	Field Trip
	Nile Case study V	STUDENT PRESENTATIONS
	Nile Case study VI	STUDENT PRESENTATIONS
	Nile Case study VII	STUDENT PRESENTATIONS
	FINAL EXAM	

References:

1- Waterbury, J. (2002) The Nile Basin: National Determinants of Collective Action. Yale University Press: New Haven, CT.

2- Blackmore, D. and D. Whittington (2008). "Opportunities for Cooperative Water Resources Development on the Eastern Nile: Risks and Rewards." World Bank: Washington, DC

3- Greiner, A., and W. Semmler. 2008. The Global Environment, Natural Resources, and Economic Growth. Oxford: Oxford University Press.

Barbier, Edward B. 2005. Natural Resources and Economics Development. Cambridge: Cambridge University Press.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 7 :

Course Title: Ethnicity and Nationalism in World Politics, Code/CHs: IR-414/3

1. Course objective: This course has four main primary goals. Upon completion of the course, Student will:
2. understand the main conceptualizations of ethnicity and nationalism.
3. understand the potential consequences of ethnic diversity and nationalism.
4. understand different approaches taken by countries to reduce the risks of ethnic conflict.

have learned about several ethnically diverse countries around the world have experience and responded to ethnic conflict.

Course details:

WEEK	LECTURE TOPIC	NOTICE
	THEORETICAL PERSPECTIVES and THE NATURE OF ETHNIC CONFLICT	
W1	Ethnicity, Nation and Nationalism: Definitions and Theories(I)	
W2	Ethnicity, Nation and Nationalism: Definitions and Theories(II)	
W3	Applying nationalism approaches to case studies	
W4	Sources of Nationalism and Ethnic Conflict	
W5	Ethno-religious conflict: The Role of Religion	
W6	International Dimension of Ethnic Conflict	
	DEALING WITH CONFLICT	
W7	Is War Inevitable in Multi-Ethnic Societies	
W8	Managing interethnic conflict in multiethnic societies	
W9	Third Party Intervention and the questions of ethics	
W10	Prevention of Ethnic Conflict	
W11	Ethnic Conflict Transformation	
W12	Truth Commissions and War Crimes Tribunals	
W13	CASE TO DISCUSS	STUDENT PRESENTATIONS
W14	CASE TO DISCUSS	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References:

1- Louis Kriesberg, Constructive Conflict:From escalation to resolution, 3rd edition (Oxford, UK: Rowman & Littlefield Publishers, INC.)

2- Rothbard,Daniel and Karina V. Korostelina, eds. Identity, Morality, and Threat (Plymouth, UK: Rowman & Littlefield Publishers, 2006

3- Michael Brown. Nationalism and Ethnic Conflict (Cambridge, Mass.: The MIT Press, 2001)

4- Karl Cordell and Stefan Wolff, Ethnic Conflict:Causes,Consequences and Responses, Polity Press, UK, 2010

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%) Final Exam 50%

Semester 7:

Course Title: Regional Integration, Code/ CHs: IR-416/3

Course objective: The aim of this course is to provide students with a general overview of the regional integration process. Through the analysis of the main social, economic, and political challenges of the integration efforts, this comparative course aims to provide theoretical and practical tools for students to analyze the role of the different institutions and social actors involved in these integration processes

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction and Guidance: region as an analytical unit	
W2	Theories of Regional Integration	
W3	Scope of Regional Integration	
W4	Comparative Regional Cooperation	
W5	Regional Economic Integration	
W6	The Security Implications of Region and Regionalism	
W7	Regionalism and Global Governance	
W8	The State in Regionalism	
W9	The Evolution of European Regionalism	
W10	The EU as a Role Model for Regional Integration?	
W11	Regional Integration in North and South America	
W12	Regional Integration in Sub-Saharan Africa	
W13	Regional Cooperation in Middle	
W14	Comparative Regional Institutions	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References:

1- Richard Baldwin and Patrick Low (eds.), 2009: Multilateralizing Regionalism. Cambridge:- Cambridge University Press

2- Walter Mattli. 1999. The Logic of Regional Integration, Cambridge: Cambridge University Press,

3- Lloyd Gruber. 2000. Ruling the World: Power Politics and the Rise of Supranational Institutions. Princeton: Princeton University Press

4- Edward D. Mans_eld and Helen V. Milner. 1997. The Political Economy of Regionalism. New York: Columbia University Press

5- Amitav Acharya and Alastair Johnston (eds.)Crafting Cooperation. Regional International

Institutions in Comparative Perspective. Cambridge: Cambridge University Press

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 7:

Course Title: Theories of Diplomacy, Code/CHs: DS-411/3

Course objective: In the context of growing global interest in diplomacy, this course provides a broad understanding of the ways in which international relations and diplomatic theories can illuminate diplomatic practice in the real world. The course will enable students to reflect on their experiences, and, by deepening their knowledge of theories and concepts, facilitate their understanding of international relations, in general, and diplomacy, in particular.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Course Scope, Content, and Themes	
	INVENTING DIPLOMACY	
W2	Historical and Westphalian Diplomacy	
W3	Multilateral Diplomacy: Woodrow Wilson, the Paris Peace Conference	
W4	Cold War Diplomacy: Nuclear, Crisis, Summit Diplomacy	
	THEORIZING DIPLOMACY	
W5	Realist Views of Diplomacy: The state system	
W6	Pluralist Views of Diplomacy: International society	
W7	Solidarist Views of Diplomacy: World society	
W8	American Theories of Diplomacy	
W9	Small and Middle Power Theories of Diplomacy	
	DEBATING THE FUTURE OF DIPLOMACY	
W10	Obsolescence and Reform	
W11	Emerging Regional Diplomacies	
W12	Transforming and Enlarging Diplomacy: New Actors	
W13	Diplomacy's Theoretical and Practical Future(I)	STUDENT PRESENTATIONS
W14	Diplomacy's Theoretical and Practical Future(II)	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- G. R. Berridge, Diplomacy: Theory and Practice. 4th ed. Basingstoke: Palgrave, 2010.

2- G. R. Berridge, Maurice Keens-Soper, and T. G. Otte, Diplomatic Theory from Machiavelli to Kissinger.

Basingstoke: Palgrave, 2001.

3 - G. R. Berridge and Alan James, A Dictionary of Diplomacy, 2nd. ed., Basingstoke, UK:Palgrave Macmillan, 2003.

4 - .Christer Jönsson and Richard Langhorne (eds), Diplomacy, 3 volume-set. London: Sage Publications, 2004.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 7:

Course Title: African Diplomacy and Foreign Policy, Code/CHs: DS-413/3

Course objective: The objective of this course is to provide an in-dept overview of both the historical and contemporary interstate relations in Africa and to situate Africa within world affairs. This course is designed to provide an analysis of the major themes and workings of international politics in Africa. This course aims to provide a greater understanding of the environment within which African states conduct their international relations, with particular attention being paid to providing a good understanding of the actors, contexts and outcomes

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction: Course Overview and Historical Parameters	
W2	African States, the State System, and Global Politics	
W3	Foreign Policies of Post-Colonialism	
W4	Africa and the World Political Economy	
W5	Foreign Policy Making in West Africa	Guest lecture
W6	Foreign Policy Making in Central Africa	Guest lecture
W7	Foreign Policy Making in the Great Lakes and the Horn of Africa	Guest lecture
W8	Foreign Policy Making in Southern Africa	Guest lecture
W9	The United States, and China's Engagement in Africa	
	AFRICAN UNION	
W10	AU overview (I)	

WEEK	LECTURE TOPIC	NOTICE
W11	AU overview (II)	
W12	AU overview (II)	Field trip
W13	CLASS PRESENTATIONS	
W14	CLASS PRESENTATIONS	
W15	FINAL EXAM	

References

1- Gilbert M. Khadiagala and Terrence Lyons, eds., African Foreign Policies: Power and Process, (Boulder, Co: Lynn Rienner Publishers).

2- Christopher Clapham, Africa and the International System: The Politics of Survival, (New York: Cambridge University Press).

3- John W. Harbeson and Donald Rothchild, eds., Africa in World Politics: Reforming Political Order, (Boulder, Co: Westview Press).

4- Chris Alden, China in Africa, (London: Zed Books).

5- Raymond W. Copson, The United States in Africa: Bush Policy and Beyond, (London: Zed Books).

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%)

Final Exam 50%

Semester 8:

Course Title: International Relations Theory, Code/CHs: IRDS-425/3 Course objective: By the end of this course, students should be able to:

1/ Explain the major theories of international relations

2/ Describe the major similarities and differences between the major IR theories

3/ Identify leading authors in the IR field and the theories they are associated with

4/ Understand the historical evolution of IR theory over time

5/ Apply theoretical frameworks to understanding practical international relations issues

6/ Assess the behaviour of actors in international politics in light of IR theories

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction: Theory and Purpose in World Politics	
W2	Thucydides: The Causes of War	
W3	Thucydides: Interest, Justice and Power	
W4	Thomas Hobbes: The Creation of a Tradition	
W5	Hugo Grotius: International Society and the Law of Nations	
W6	Jean-Jacques Rousseau	
W7	Immanuel Kant and the Liberal Tradition	
W8	Marxism and International Relations	
W9	E. H. Carr: Between Realism and Utopianism	
W10	Hans Morgenthau: The End of Classical Realism	
W11	Hedley Bull and the "English School"	
W12	The Contemporary Neo-Neo Debate	
W13	The Constructivist and Post-Modern Challenge	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References

1 - Robert Keohane. 1984. After Hegemony: Cooperation and Discord in the World PoliticalEconomy. Princeton: Princeton University Press. (AH)
2 - Robert Keohane, ed. 1986. Neo-Realism and Its Critics. New York: Columbia University
3 - John Mearsheimer. 2001. The Tragedy of Great Power Politics. New York: W.W. Norton-Company.
4- Brock Tessman. 2007. International Relations in Action. Boulder: Lynne Rienner Publishers

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 8:

Course Title: International Migration & Refugee Issues, Code/CHs: IRDS-427/3

Course objective: The objective of the course is to enable students to gain an analytical understanding of the broad field of migration and refugee studies.

To apply relevant concepts and analytical frameworks and to develop a critical understanding of both academic literature and policy arenas.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introducing some theories/approaches to migration	
W2	Theories of International Migration, Migration Systems, and Multiculturalism	
W3	Feminization of migration	
W4	Global Politics of Migration	
W5	UNHCR and IOM	Guest lecture:
W6	Cross-border issues in migration: human trafficking	
W7	Immigration, Identity and Violence	
W8	Impact of Forced Migration (Host State and Local Communities)	
W9	Internally Displaced Persons	
W10	Response to Refugee Situations: Regional Actors	
W11	Environmental and climate refugee Vs war refugees	
W12	Development-induced Displacement and Resettlement (DIDR)	
W13	Refugee Camps, Violence against women in refugee camps/Security and Protection Issues; and Children of refugees	Field Trip
W14	Post-Trip Seminar	
W15	FINAL EXAM	

References

1- Sudarmo Riwanto Tirto. 2007. Critical Issues in Forced Migration Studies and the Refugee Crisis in Southeast Asia. Research Centre for Society and Culture.

2- Castles, Stephen and Miller, Mark J. 1998. The Age of Migration: International Population Movements in the Modern World. Hampshire: Macmillan Press

3- Koser, Khalid & Martin, Susan (eds.), The migrationdisplacement nexus, patterns, processes and policies, New York: Berghahn Books

4- Cordell, Denis D., Gregory, Joel W. & Piché, Victor. 1998. Hoe and Wage: A social history of a circular migration system in West Africa, Boulder, CO: Westview Press

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 8:

Course Title: International Politics of Energy, Code/CHs: IR-421/3

Course objective: The course will introduce students to the major theoretical lenses that can

be used to explain how societies design and implement public policies related to energy. The course will apply these theories to major current and historical issues in energy policy, such as the biofuels, the management of national oil companies, electric power market restructuring, climate change, and the functioning of OPEC.

Course Details:

WEEK	LECTURE TOPIC	NOTICE
W1	Introduction: Political Economy and the Energy System	
W2	Energy as a Determinant of the International System	
W3	The Global Energy Landscape: Demand, Supply, and Price	
W4	Oil: Reserves, Production, Technology	
W5	The International Oil Market Functioning	
W6	Natural Gas: Reserves, Production, Technology, Perspectives	
W7	The U.S. Military and Energy	
W8	China's Rise and Thirst for Energy:	
W9	Consumer Leverage and the Use of Sanctions: The Case of Iran	
W10	Energy Policies in the US and Europe:	
W11	Nuclear energy	
W12	ALTERNATIVE, RENEWABLE, AND NEW ENERGY(I)	
W13	ALTERNATIVE, RENEWABLE, AND NEW ENERGY(II)	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References

1- Daniel Yergin, The Prize: The Epic Quest for Oil, Money, and Power (Free Press), 2008.
2- Gal Luft and Anne Korin (eds.), Energy Security Challenges for the 21st Century (Santa Barbara, CA: Praeger Security International), 2009.
3- Carlos Pascual and Evie Zambetakis (eds), Energy Security: Economics, Politics, Strategies and Implications, (Washington DC: Brookings), 2010.
4- Daniel Yergin, The Quest: Energy, Security, and the Remaking of the Modern World, (New York: Penguin Press), 2011.

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%)

Final Exam 50%

Semester 8:

Course Title: Ethics, Religion and International Politics, Code/CHs/:IR-423/3

Course objective: This class examines diverse religious and secular models for relating ethics to contemporary international affairs, as well as specific areas of international politics where ethical questions are likely to arise, including sovereignty, terrorism, peacemaking, human rights, economic justice, and the use of force in war or humanitarian interventions. Special attention is given to theological perspectives and religious actors.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	Ethics, religion and international politics	
W2	Religion and international relations theory	
W3	Secularization and secularism in international relations	
W4	Sovereignty: past, present, future	
W5	State/religion in comparative perspective	
W6	Cosmopolitanism and global citizenship	
W7	Human development and common goods	
W8	Religion and foreign policy	
W9	International law and local justice	
W10	Religious traditions of nonviolence	
W11	Religious violence and terrorism	
W12	Drones and the era of remote killing	
W13	STUDENT PRESENTATIONS	
W14	STUDENT PRESENTATIONS	
W15	FINAL EXAM	

References:

1- Kwame Anthony Appiah, Cosmopolitanism: Ethics in a World of Strangers (Norton, 2007)

2- John Carlson and Erik Owens, eds., The Sacred and the Sovereign: Religion and International Politics (Georgetown, 2003)

3- Michael Gross, Moral Dilemmas of Modern War: Torture, Assassination, and Blackmail in an Age of Asymmetric Conflict (Cambridge, 2009)

4- Martha Nussbaum and Joshua Cohen, For Love of Country? (Beacon, 2002)

5- Michael Walzer, Just and Unjust Wars [4e] (Basic Books, 2006)

6- Timothy Samuel Shah, Alfred Stepan and Monica Duffy Toft, eds. Rethinking Religion

and World Affairs (Oxford 2012)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 8:

Course Title : International Mediation & Conflict Resolution, Code/CHs:DS-422/3 Course objective: The course has the following main aims:

(1) To help students understand the range of conflict interventions, including various theoriesunderlying different approaches and contingency theories for intervention.

(2) To provide students with practical frameworks, tools and skills for conflict intervention.

(3) To provide the students with the basic skills to understand and the theory and practice of mediation.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	History of Conflict Intervention Theory and Practice	
W2	Contingency Theories of Third Party Intervention	
W3	Mediation - Part I: Theory and Research	
W4	Mediation - Part II: Theory and Skills	
W5	Mediation - Part III: Case Studies and Practice	
W6	Pre-Negotiation, Second-Track Diplomacy	
W7	Post-Conflict Reconciliation	
W8	Mediated national integration after protracted civil conflict : Case Studies	Group Presentations
W9	Mediated settlements & implementation(I)	
W10	Mediated settlements & implementation,(II)	
W11	Conflict prevention and proactive management	
W12	A transformative approach	
W13	Future directions for the field	
W14	group simulation	
W15	FINAL EXAM	

References

1- Crocker, Chester, Fen Osler Hampson, and Pamela Aall, eds. 1999. Herding Cats: Multiparty Mediation in a Complex World. Washington, D.C.: U.S. Institute of Peace Press.

2- Greenberg, John H. Barton, and Margaret E. McGuinness, eds. 2000. Words Over

War: Mediation and Arbitration to prevent Deadly Conflict. Boulder: Rowman & Littlefield Publishers.

3- Hampson, Fen Osler. 1996. Nurturing Peace: Why Peace Settlements Succeed or Fail. Washington,D.C.: U.S. Institute of Peace Press.

4- Lederach, John Paul. 1997. Building Peace: Sustainable Reconciliation in Divided Societies.Washington, D.C.: U.S. Institute of Peace Press.

5- Zartman, I. William, and J. Lewis Rasmussen, eds. 1997. Peacemaking in International Conflict:Methods a& Techniques. Washington, D.C.: U.S. Institute of Peace Press.

6- Chester A. Crocker, Fen Osler Hampson, and Pamela Aall, eds., Leashing the Dogs of War: Conflict Management in a Divided World (Washington: USIP Press, 2007).

7- Chester A. Crocker, Fen Osler Hampson, and Pamela Aall, Taming Intractable Conflicts:- Mediation in the Hardest Cases (Washington: USIP Press, 2004)

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%)

Presentations and written summaries (20%)

Mid-term short papers (20%) Final Exam 50%

Semester 8:

Course Title: Cultural Diplomacy, Code/CHs:DS-424

Course objective:

This course explores cultural diplomacy (CD), broadly understood: the exchange of performances and ideas across state borders with the intention of building political influence, abroad or at home. We consider the theory and practice of cultural diplomacy in several contexts.

Course details:

WEEK	LECTURE TOPIC	NOTICE
W1	?Introduction. What is culture	
W2	The cultural turn in international relations	
W3	Concepts: cultural transfer, soft power, cultural diplomacy, public diplomacy, citizen diplomacy	
W4	Diplomacy as culture and performance	
W5	Cultural diplomacy as art and ideology, 1: Soviet-American exchanges	
W6	Cultural diplomacy as art and ideology, 2: Music in US-Latin American exchanges	
W7	UNESCO and international organizations in Cultural Diplomacy	
W8	Competing in a World of Soft Power	
W9	Reviving/remaking cultural diplomacy	

WEEK	LECTURE TOPIC	NOTICE
W10	Issues in Contemporary Cultural Diplomacy	
W11	Sports, Art & Photography, Music & Performing Arts	
W12	?New media and the end of diplomacy	STUDENT PRESENTATIONS
W13	Cultural Diplomacy and Terrorism	STUDENT PRESENTATIONS
W14	Evaluating Cultural Diplomacy	STUDENT PRESENTATIONS
W15	FINAL EXAM	

References

1- Breidenbach, Joana and Pál Nyíri. 2009. Seeing Culture Everywhere: From Genocide to Consumer Habits. Seattle: University of Washington Press

2- Michael J. Hogan and Thomas G. Paterson, eds. Explaining the History of American Foreign Relations (2d. ed.),. Cambridge: Cambridge University Press

3- Prevots, Naima. 1998. “Ballet and Soviet-American Exchange.” Dance for Export, Cultural Diplomacy and the Cold War, 69-91. Hanover: Wesleyan University Press

4- Iriye, Akira. 1997. Cultural Internationalism and World Order. Baltimore: Johns Hopkins University Press.

5- Ninkovich, Frank. 1995. The Diplomacy of Ideas: U.S. Foreign Policy and Cultural Relations, 1938-1950. Chicago: Imprint Publications.

6- Arndt, Richard T. 2005. The First Resort of Kings: American Cultural Diplomacy in the Twentieth Century. Washington D.C.: Potomac Books

Assessment: The evaluation of students will be distributed as follows:

Class participation (10%) Presentations and written summaries (20%) Mid-term short papers (20%)

Final Exam 50%

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

Semester (1)

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Islamic studies-1	IRDS -111	Longit.	2	--	-	2
2	Arabic or alternative language-1	IRDS -112	,,	2	-	-	2
3	English language-1	IRDS -113	,,	2	-	-	2
4	Islamic studies-2	IRDS -110	,,	2	-	-	2

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
5	English language-2	IRDS-114	,,	2	-	-	2
6	Arabic or alternative language-2	IRDS-122	,,	2	-	-	2
7	Introduction to computer -1	IRDS-122	,,	2	-	-	2
8	Introduction to computer -1	IRDS-131	,,	2	-	-	2
9	Sudanese Studies	IRDS-213	,,	2	-	-	2
			18	18	-	-	18

Semester 2 [22 CHs- 20 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -1	IRDS-113	Longit.	2	--	-	2
2	Introduction sociology	IRDS-116	,,	2	-	-	2
3	Economics Principles	IRDS-117	,,	2	-	-	2
4	Introduction to political Sciences	IRDS-118	,,	3	-	-	3
5	Political Concept & terminology	IRDS-119	,,	3	-	-	3
6	Chosen Language -2	IRDS-124	,,	2	-	-	2
7	Introduction to Statistics	IRDS-125	,,	2	-	-	2
8	Introduction to Conflict Analysis & resolution	IRDS-126	,,	3	-	-	3
9	English Language 3	IRDS-211	‘’	2	-	-	2
			18	21	-	-	21

Examinations (2 weeks)

Semester 3 [19 CHs- 15weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -3	IRDS-212	Longit.	2	--	-	2
2	English language -4	IRDS-221	,,	2	-	-	2
3	Public policy: process and strategies	IRDS-214	,,	3	-	-	3
4	Introduction to modern diplomacy	IRDS-215	,,	3	-	-	3
5	International Politics & international security	IRDS-216	,,	3	-	-	3
6	Introduction to social research methods	IRDS-124	,,	3	-	-	3
7	Strategic geography	IRDS-223	,,	3	-	-	3
			15	19	-	-	19

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Semester 4 [19 CHs- 15weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -3	IRDS-212	Longit.	2	--	-	2
2	English language -4	IRDS-221	,,	2	-	-	2
3	Public policy: process and strategies	IRDS-214	,,	3	-	-	3
4	Introduction to modern diplomacy	IRDS-215	,,	3	-	-	3
5	International Politics & international security	IRDS-216	,,	3	-	-	3
6	Introduction to social research methods	IRDS-124	,,	3	-	-	3
7	Strategic geography	IRDS-223	,,	3	-	-	3
			15	19	-	-	19

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Semester 5 IR [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -5	IRDS-311	Longit.	2	--	-	2
2	English language -6	IRDS-313	,,	2	-	-	2
3	International organization	IRDS-315	,,	3	-	-	3
4	International conflict theories and case studies	IRDS-317	,,	3	-	-	3
5	Gender and international relations	IR-314	,,	3	-	-	3
6	International human rights law	IR-312	,,	3	-	-	3
7	International politics of the middle east	IR-316	,,	3	-	-	3
			15	19	-	-	19

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Semester (5) DS Specialty [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -5	IRDS-311	Longit.	2	--	-	2
2	English language -6	IRDS-313	,,	2	-	-	2
3	International organization	IRDS-315	,,	3	-	-	3
4	International conflict theories and case studies	IRDS-317	,,	3	-	-	3
5	Diplomatic history	DS-311	,,	3	-	-	3
6	International negotiations and practices	DS-313	,,	3	-	-	3
7	Diplomacy & International Law	DS-315	,,	3	-	-	3
			15	19	-	-	19

Examinations (2 weeks)

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Repeat courses or examinations for late comers and failures.

GRADUATIOM

Semester (6) international relations Specialty [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -6	IRDS-323	Longit.	2	--	-	2
2	English language -7	IRDS-411	,,	2	-	-	2
3	Quantitative and qualitative methods of social science	IRDS-325	,,	3	-	-	3
4	international organization: UN system	IRDS-327	,,	3	-	-	3
5	Theories and politics of globalization	IR-322	,,	3	-	-	3
6	International environmental politics	IR-324	,,	3	-	-	3
7	Contemporary African policy	IR-326	,,	3	-	-	3
			15	19	-	-	19

Semester (6) diplomatic Studies Specialty [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -5	IRDS-323	Longit.	2	--	-	2
2	English language -6	IRDS-411	,,	2	-	-	2
3	Quantitative and qualitative methods of social science	IRDS-325	,,	3	-	-	3
4	international organization: UN system	IRDS-327	,,	3	-	-	3
5	Global governance and diplomacy	DS-321	,,	3	-	-	3
6	International crisis diplomacy	DS-323	,,	3	-	-	3
7	Global perspective on public diplomacy	DS-325	,,	3	-	-	3
			15	19	-	-	19

Semester (7) international relations Specialty [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -7	IRDS-413	Longit.	2	--	-	2
2	English language -8	IRDS-422	,,	2	-	-	2
3	Theory and policies of international development	IRDS-415	,,	3	-	-	3
4	Non governmental organizations and international politics	IRDS-417	,,	3	-	-	3
5	Water cooperation and conflict: Nail Basin case study	IR-412	,,	3	-	-	3
6	Ethnicity and Nationalism in world politics	IR-414	,,	3	-	-	3
7	Regional integration	IR-326	,,	3	-	-	3
			15	19	-	-	19

Semester (7) DS Specialty [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -7	IRDS-413	Longit.	2	--	-	2
2	English language -8	IRDS-422	,,	2	-	-	2
3	Theory and policies of international development	IRDS-415	,,	3	-	-	3
4	Non governmental organizations and international politics	IRDS-417	,,	3	-	-	3
5	Theories Dipolmacy	DS-411	,,	3	-	-	3
6	African Diplomacy And Foreign Policy	DS-413	,,	3	-	-	3
7	Foreign Ministry internship	DS-415	,,	3	-	-	3
			15	19	-	-	19

Semester (8) international relations Specialty [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -8	IRDS-424	Longit.	2	--	-	2
2	International Relation theory	IRDS-426	,,	3	-	-	3
3	International migration and Refugees Issues	IRDS-428	,,	3	-	-	3
4	International politics of Energy	IR-421	,,	3	-	-	3
5	Ethnics, Religion and international politics	IR-423	,,	3	-	-	3
6	Dissertation	IR-425	,,	6	-	-	6
	Total		20	20	-	-	20

Semester (8) diplomatic Studies [22 CHs- 15 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Chosen Language -8	IRDS-424	Longit.	2	--	-	2
2	International Relation theory	IRDS-426	,,	3	-	-	3
3	International migration and Refugees Issues	IRDS-428	,,	3	-	-	3
4	International Migration & conflict Relation	DS-421	,,	3	-	-	3
5	Cultural Diplomacy	DS-424	,,	3	-	-	3
6	Dissertation	DS-426	,,	6	-	-	6
	Total		20	20	-	-	20

This is an independent study research project involving an in-depth exploration into international relation & Diplomatic Studies topic chosen by the student in consultation with a faculty member

FACULTY OF

GRADUATE STUDIES

UNDERGRADUATE
& GRADUATE
PROSPECTUS

Vision

NUSU be the leading provider of graduate programmes assuring most distinctive ever excelling excellence

Mission

Grantee and maintain high quality standards of graduate programmes offered by NUSU through continuous internal and external assessment to secure sustainability and social responsibility

Message from the Dean Faculty of Graduate Studies and Scientific Research

- With great pleasure the Faculty of Graduate Studies and Scientific Research of NUSU welcomes and invites students and stakeholders to profit from its distinguished high quality programme.
- The programme offered by NUSU are well designed by experts to achieve well focused outcomes.
- The programme are accredited by the Ministry of Higher Education and Scientific Research and continuously updated to comply with innovations in knowledge and technology.
- The National University-Sudan obtained the ISO (International Standardization Organization) in 2009 and accredited by the BAC (British Accreditation Council) in 2015.
- The Faculty of Graduate Studies and Scientific Research strictly abides by respect, ethics and social responsibility to conserve legal rights and privacies of the students and stakeholders.
- NUSU provides and secures highly qualified staff and elegant environment (lecture rooms,up to date laboratory facilities and equipment, paper and electronic libraries, rest rooms etc…) for convenient conveyance of the various programme components.
- The teaching staff and the administrators are always ready for any help when needed.
- You are most welcome joining the Faculty of Graduate Studies and Scientific Research

You work hard to perfection
You do more to excel
You do more and more to excel yourself
Thence, Thence, Thence
NUSU congratulates you

About the Faculty of Graduate Studies and Scientific Research-NUSU

The National University-Sudan launched its graduate studies for the first time in July 2013 by admission of 12 students in Human Anatomy. The first batch of 11 students was graduated and awarded M.Sc. Human Anatomy in May 2015. The Faculty of Graduate Studies and Scientific Research was established in 2015 in compliance with the law of the National University-Sudan 2015. The Faculty of Graduate Studies and Scientific Research closely oversees the execution of the programmes from admission to graduation and coordinates with the various faculties offering graduate programmes to grantee distinctive high quality outcomes.

Graduate Programmes and Degrees Offered by NUSU

Master by Course in:

- Business Administration General
- Projects Management
- Human Resource Management
- Financial Management
- Hospital Management
- Entrepreneurship
- Marketing.

Master by Course and Dissertation in:

Haematology and Immunohaematology

- Histopathology and Cytology
- Microbiology and Infection control
- Parasitology and Medical Entomology
- Chemical Pathology

Masters by Course and Dissertation in:

- Human Clinical Anatomy

PhD by Research in:

- Human Clinical Anatomy

Master by Course and Dissertation in:

- Hospital Pharmacy

Master by Course and Dissertation in:

- Medical Diagnostic Radiography
- Diagnostic Medical Ultrasound

Master by Course in:

M.Sc. Bioinformatics (Awaiting final approval from the Ministry of Higher Education and Scientific Research)

Faculty of Administrative Sciences
Master of Business Administration (MBA)

General Introduction

Success in business, not like ever before, requires an innovative thinking and apt skills to comply with the imperatives and conditions of the era of knowledge, globalization and international trade. This implies an involvement of highly qualified personnel in business vis-à-vis:

- Business Administration General
- Projects Management
- Human Resource Management
- Financial Management
- Hospital Management
- Entrepreneurship
- Marketing

For this the National University offers a programme in business administration (MBA) coping with community needs as due to graduate self-employment in light of the limited and rare government job opportunities. The MBA programme also targets bridging the gap in university teachers, and researchers in business administration.

General Objectives

- Provide training opportunities at master level in management for university staff and for seekers of professionalism.
- Familiarize the potential candidacy of the programme with concepts and principles of management
- Empower the business sector in Sudan with qualified personnel in management
- Prepare the Sudanese industry for competitive globalization and international trade.

Human Resources and Facilities

Teaching staff : One professor, five associate professors, five assistant professors

Facilities: Four lecture rooms: 200 seats, two computer labs: 150 seats. National University main library: 400 seats. E-library: 250 seats

Admission Requirements

- Applicant must satisfy the general regulations set by the Faculty of Graduate Studies and Scientific Research of the National University for registration for master degrees.
- Eligible candidates are holders of:

- (a) B.Sc. (Honors) Business Administration with grade Good (Second Class) at least
- (b) B.Sc. (Honors) Business Administration with grade Pass (Third class) in addition to at least one qualifying semester.
- (c) B.Sc. (General) Business Administration with grade Good (Second Class) at least in addition to:
- One qualifying year with grade Good at least or
- Postgraduate Diploma in Business Administration with grade Good at least.

(d) B.Sc. (General) Business Administration with grade Pass (Third Class) in addition to a Postgraduate Diploma in Business Administration with Grade Good at least.

(e) B.Sc. (Honors or General) with grade Good (Second Class) in any Discipline in addition to a Postgraduate Diploma in Business Administration.

(f) B.Sc. (Honors or General) with grade Pass (Third Class) in any Discipline in addition to three years working experience after graduation plus a Postgraduate Diploma in Business Administration.

Duration of Programme: Three semesters: 15 weeks each

Teaching Modules : Lectures; Seminars and Presentations; Case studies; Group research; Assignments; Report writing, Guest speaks.

Teaching Language: English

Examinations Regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- Each student shall conduct a supervised published or accepted paper in a refereed journal.

Assessment: Continuous assessment 50%, final examination 50%,

Grading System: A^+ (≥ 85) A (80 - 84) B^+ (70 - 79) B (65 - 69) C (60-64) F (60) <

Master of Business Administration (MBA) General

Specific Objectives

The programme qualifies the candidates to:

- Communicate professionally to bridge diverse perspectives, cultures, and disciplines.
- Analyze ethical implications in business practices.
- Apply quantitative problem-solving methods in business.
- Assess global opportunities and challenges facing business growth.
- Behave and collaborate as a business leader.

Expected Learning Outcomes

Upon completion of the programmeme, successful candidates should be able to:

- Identify and solve organizational problems by systematic and analytical decision-making approaches.
- Identify personnel values and their effect on decision-making within an organization.
- Evaluate the compliance of plans and actions with the organization's values.
- Manage personnel to meet changing organizational needs in business environment.
- Evaluate the implications of changing environment on organization's choices.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	Human Resources Management	3(2+1)	2	2
PRO-522	Project Management	3(2+1)	2	2
ETP-523	Business Ethics and Social Responsibility	3(2+1)	2	2
MAG-524	Production and Operation Management	3(2+1)	2	2
MEP-525	Entrepreneurship	3(2+1)	2	2

Semester Three

(Three Elective Courses + MAG-531 Strategic Management and MAG-538 Research Paper)

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MAG-531	Strategic Management	3(2+1)	2	2
MAG-532	Managerial Economics	3(2+1)	2	2
MAG-533	Leadership and Decision Making	3(2+1)	2	2
MAG-534	Total Quality Management	3(2+1)	2	2
MAG-535	Marketing Research	3(2+1)	2	2
MAG-536	Corporate Finance	3(2+1)	2	2
MAG-537	International Business	3(2+1)	2	2
MAG-538	Research Paper	3(0+3)	0	6

Courses Contents

ACC-511 Cost and Management Accounting

Introduction; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions

MAR-512 Marketing Management

Market determination; Customer value and satisfaction; Product planning and development; Strategic marketing decisions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution, promotion, Wholesaling and retailing. Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information systems successes and failures; Privacy and security of information systems; Ethical and social aspects related to information systems; Information systems departments (ISD).

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information system success and failure; Privacy and security of information systems; Ethical and social aspects related to information system; Information system departments (ISD).

FIN-514 Financial Management

Introduction and objectives; Financial management environment; Interest rates and required rate of returns; Financial statements; Taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value (NPV); Internal rate of

return (IRR); Modified internal rate of return (MIRR); Cash flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling, Development programme: motivation and compensation; Global HRM.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project applications.

ETP-523 Business Ethics and Social Responsibility

Introduction; Ethics in business; Good life as the goal of ethics; Finding Ethics in Business; Business values; Ethics and legal professionals; Trust and truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operation Management

Introduction; Location planning; Capacity planning; Facilities layout; Inventory control; Materials required for planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management

MEP-525 Entrepreneurship

Introduction; Entrepreneurial process; Entrepreneurship and creativity; Entrepreneurial assessment; Business plan development; Business plan writing; Presenting business plan; Business problem-solving for the Entrepreneur; Marketing plan development; Customer new business start up; Basic and advanced website development; Entrepreneurship in practice; Applications: eBay®; Developing business opportunities and plans; Taking innovation to Market; Financing entrepreneurial operations.

MAG-531 Strategic Management

Introduction; Internal context of strategy; Exploring the external environment: Macro and industry dynamics; Crafting and dynamic business strategy; International strategies; Alliances and cooperative strategies; Implementation of strategies.

MAG-532 Managerial Economics

Scope of managerial economics; Basic economic concepts; Elasticity and revenue; Demand estimation; Competitive market equilibrium; Production Iso-quants; Marginal rate of technical substitution; Iso-cost line; Cost analysis and estimation: Cost function; Profit maximization; Markets types.

MAG-533 Leadership and Decision Making

Define leadership; Personal leadership; Organizational leadership; Global leadership; Personal leadership profile; Leadership in Community context; Leadership theory; Leadership concepts.

MAG-534 Total Quality Management

Basics of total management; Evolution of quality; Foundations for total quality management; Total quality management (TQM) culture; Preparing for total quality management; Quality problems; Quality certification; TQM performance.

MAG-535 Marketing Research

Role of marketing research in management; Decision-making: definition and research process; Secondary data and databases; Qualitative research; Survey research; Primary data collection; Observation; Experimentation; Concept of measurement attitude and scales; Questionnaire design; Sampling issues; Data processing and data analyses; Communicating research results; Managing marketing research; Research ethics.

MAG-536 Corporate Finance

Objectives and organization; Financial institutions; Markets; Types of financing: Short and long term loans; Lease finance; Capital structure; Long term finance; Equity financing; Debt financing; Cost of capital; Valuation of stock and bonds; valuation of stock, Valuation of stock and bonds; Risk and return; Dividend policy.

MAG-537 International Business

Future and challenges of globalisation; Economic, legal, and political systems; Ethics and international business; International trade: Firms and international trade; Governments and regulations of international trade; Foreign direct investment (FDI); Sudan bilateral agreements; Technical and financial studies in domestic and MNC companies; Foreign market entry modes.

ENP-538 Research Paper: Publish a paper in a refereed scientific journal.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Business Administration (MBA) General

Master of Business Administration (MBA)
Human Resources Management

Specific Objectives

The programme qualifies the candidates to:

- Understand the growing capabilities of Human Resources.
- Encourage employees to introduce innovations.
- Understand evolutions in management thoughts for business decision- making.

Expected Learning Outcomes

Upon completion of the programme, successful candidates should be able to:

- Explain the scope of HRM
- Understand and appreciate the meaning and nature of strategic HRM related to business
- Describe HR strategies informed by knowledge of labor markets and product markets locally, nationally and internationally
- Describe the dynamic nature of global competition, social, technological trends and their significance on HRM practices.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	Human Resources Management	3(2+1)	2	2
PRO-522	Project Management	3(2+1)	2	2
ETP-523	Business Ethics and Social Responsibility	3(2+1)	2	2
MAG-524	Production and Operation Management	3(2+1)	2	2
MEP-525	Entrepreneurship	3(2+1)	2	2

Semester Three

(Three Elective Courses + HUR-531 Strategic Management and HUR-538 Research Paper)

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HUR-531	Strategic Management	3(2+1)	2	2
HUR-532	Corporate Performance Management	3(2+1)	2	2
HUR-533	Personnel Management in International Organizations	3(2+1)	2	2
HUR-534	Labour Laws and Social Insurance	3(2+1)	2	2
HUR-535	Human Resources Strategic Management	3(2+1)	2	2
HUR-536	Negotiation Skills and Conflict Management	3(2+1)	2	2
HUR-537	Organization Development and Change	3(2+1)	2	2
HUR-538	Research Paper	3(0+3)	0	6

Courses Contents

ACC-511 Cost and Management Accounting

Introduction; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions

MAR-512 Marketing Management

Market determination; Customer value and satisfaction; Product planning and development; Strategic marketing decisions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution and promotion, Wholesaling and retailing.

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information systems successes and failures; Privacy and security of information systems; Ethical and social aspects related to information systems; Information systems departments (ISD).

FIN-514 Financial Management

Introduction; Objectives of financial management; Financial management environment; Interest rates and required rate of returns; Financial statements: taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value(NPV); Internal rate of return (IRR); Modified internal rate of return (MIRR); Payback period; Net present value internal rate of return (IRR); Modified internal rate of return (MIRR); Cash

flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling; Development programme; Motivation; Compensation; Turnover programme; Global HRM.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project applications.

ETP-523 Business Ethics and Social Responsibility

Introduction; Ethics in business; Good life as the goal of ethics; Finding ethics in business; Business values; Ethics and legal professionals; Trust and truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operations Management

Introduction; Location planning; Capacity planning; Facilities layout; Inventory control; Materials required for planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management

MEP-525 Entrepreneurship

Introduction; Entrepreneurial Process; Entrepreneurship and creativity; Entrepreneurial assessment; Starting own business; Business plan development; Business plan writing; Presenting business plan; Business problem-solving for the Entrepreneur; Marketing plan development; Customer service for new business start up; Basic website development; Advanced website development; Entrepreneurship in practice; Applications: Introduction to eBay®; Developing business opportunities and plans; Taking innovation to market; Financing entrepreneurial operations.

HUR-531 Strategic Management

Introduction; Internal context of strategy; Exploring the external environment: Macro and industry dynamics; Crafting and dynamic business strategy; International strategies; Alliances and cooperative strategies; Implementation of strategies.

HUR-532 Corporate Performance Management

Corporate performance management; Performance planning and analysis; Implementing performance management systems; Strategy driven performance management; Measuring re-

sults via scorecards; Performance management and people development; Performance management in action; Employee development; Team development and coaching; Development plans; Performance management and reward system; Performance management and knowledge development; Performance consulting.

HUR-533 Personnel Management in International Organizations

Overview of personal management; Best employees; Paying employees; Providing benefits, Training employees; Compliance with regulations; Ensuring safe work environment; Sustained high performance employees; General resources; Qualified new employees; Job description and orientation; Personnel records; Employees performance appraisal.

HUR-534 Labour Laws and Social Insurance

Concepts of labor law; Trade unionism; Collective bargaining; Workers participation in management; Labor welfare and social security; ILO-convention and labor administration; Workers' compensation schemes and redundancy; Qualifying for social security benefits; Social security benefit amount; Taking benefits before retirement age; Windfall elimination provision and government pension offsets; Medicare and social security; Strategies for maximizing social security; Six pillars of retirement income.

HUR-535 Human Resources Strategic Management

Introduction; Strategy formulation; Role of value in strategy formulation; Strategy implementation, communicating strategy to staff; Competitive strategy; Competitive advantages; Competitive differentiator Ethics; Linking HR to organization strategy; Organizational effectives; Trends in HR; Mission and vision; Quality management.

HUR-536 Negotiation Skills and Conflict Management

Course overview; Kinds of negotiators; Distributive and mixed motive bargaining; Integrative and mixed-motive bargaining; Competitive and cooperative styles; Negotiating in context, origins of conflict-dispute prevention; Delegating conflict management to the disputants; Employers' dispute resolution; Complaint handling systems; Conciliation; Mediation; Arbitration; Negotiation with difficult people.

HUR-537 Organization Development and Change

Introduction; Understanding change; Organizations change; Diagnosing change; Organizational diagnosis team time; Resistance to change; Implementing change; Organizational diagnosis team time, Communicating change, Continues communicating change, Organizational diagnosis team time; Sustaining change and thanks giving; Organizational diagnosis project; Presentations.

HUR-538 Research Paper: Publish a paper in a refereed scientific journal.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Business Administration (MBA) Human Resources Management

Master of Business Administration (MBA)
Marketing

Specific Objectives

The programme qualifies the candidates to:

- Understand aspects of marketing relevant to services and goods providing organizations.
- Develop strategies and approaches for addressing challenges.
- Identify services decision problems, ascertain alternatives, define crucial issues, analyze, decisions making and plan the implementation of decisions
- Identify services problems and propose solutions: Analyze to define problems, ascertain alternatives, make decisions and implement.

Expected Learning Outcomes:

Upon completion of the programme, successful candidates should be able to:

- Develop socially responsible marketing approaches.
- Evaluate consumer Behaviour.
- Evaluate the challenges and opportunities in global marketing.
- Conduct and apply marketing research to enhance decision making.
- Develop comprehensive strategic marketing planning.
- Create e-commerce marketing solutions.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	Human Resources Management	3(2+1)	2	2
PRO-522	Project Management	3(2+1)	2	2
ETP-523	Business Ethics and Social Responsibility	3(2+1)	2	2
MAG-524	Production and Operation Management	3(2+1)	2	2
MEP-525	Entrepreneurship	3(2+1)	2	2

Semester |Three

(Three Elective Courses + MAR-531 Strategic Management and MAR-539 Research Paper)

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MAR-531	Strategic Management	3(2+1)	2	2
MAR-532	Marketing Researches	3(2+1)	2	2
MAR 533	Marketing Strategies	3(2+1)	2	2
MAR-534	International Marketing	3(2+1)	2	2
MAR-535	Consumer Behaviour	3(2+1)	2	2
MAR-536	Product and Brand Management	3(2+1)	2	2
MAR-537	Services Marketing	3(2+1)	2	2
MAR-538	Current Issues in Marketing	3(2+1)	2	2
MAR-539	Research Paper	3(0+3)	0	6

Courses Contents

ACC-511 Cost and Management Accounting

Introduction; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions

MAR-512 Marketing Management

Market determination; Customer value and satisfaction; Product planning and development; Strategic marketing decisions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution and promotion, Wholesaling and retailing.

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems:

Planning and development; Tools and methods of building information systems, Information system success and failure; Privacy and security of information systems; Ethical and social aspects related to information system; Information system departments (ISD).

FIN-514 Financial Management

Introduction; Objectives of financial management; Financial management environment; Interest rates and required rate of returns; Financial statements: taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value(NPV); Internal rate of return (IRR); Modified internal rate of return (MIRR); Payback period; Net present value internal rate of return (IRR); Modified internal rate of return (MIRR); Cash flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling; Development programme; Motivation; Compensation; Turnover programme; Global HRM.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project applications.

ETP-523 Business Ethics and Social Responsibility

Introduction; Introduction to business ethics; Ethics in business; Good life as the goal of ethics; Finding ethics in business; Business values; Ethics and legal professionals; Trust and truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operation Management

Introduction; Location planning; Capacity planning; Facilities layout; Inventory control; Materials required for planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management

MEP-525 Entrepreneurship

Introduction; Entrepreneurial process; Entrepreneurship and creativity; Entrepreneurial assess-

ment; Starting own business; Business plan development; Business plan writing; Presenting business plan; Business problem-solving Entrepreneur; Marketing plan development; Customer service for new business start up; Basic website development; Advanced website development; Entrepreneurship in practices Applications: Introduction to eBay®;Developing business opportunities and plans; Taking innovation to market; Financing entrepreneurial operations.

MAR-531 Strategic Management

Introducing; Leading strategically; Examining internal context of strategy; Exploring external environment: Macro and industry dynamics; Crafting business strategy; Crafting business strategy for dynamic contexts; Looking at international strategies; Alliances and cooperative strategies; Employing strategy implementation levers. Strategic management; Internal context of strategy; Exploring external Environment: Macro and industry dynamics; Crafting and dynamic business strategy; International strategies; Alliances and cooperative strategies; Implementation of strategies.

MAR-532 Marketing Researches

Introduction; Role of marketing research ; Definition of research process, Secondary data and databases; Qualitative research; Survey research; Primary data collection; Observations; Experimentations; Concept of measurement attitude and scales; Questionnaires designs; Sampling issues; Data processing and analysis; Communicating research results; Managing marketing research, Research ethics.

MAR-533 Marketing Strategies

Introduction; Review of marketing elements; Analysis of marketing opportunities ; Analysis of marketing planning; Issues of e-marketing and global marketing; Managing integrated marketing communications; Insuring marketing and strategic management; Work together.

MAR-534 International Marketing

Introduction; Scope and challenges of international marketing; International marketing strategy; International legal environment; Foundations of culture; Cultural dynamics in assessing global markets: Culture, management style and business systems; Political environment; Critical concern; International legal environment: Case studies

MAR-535 Consumer Behaviour

Introduction; Consumer Behaviour; Consumer Behaviour-meeting changes and challenges; Consumer research process; Market segmentation and strategic targets; Consumer motivation; Personality and consumer Behaviour; Consumer perception; Consumer decision making; Consumer learning; Consumer attitude formation and change; Communications and consumer Behaviour; Culture influences on consumers Behaviour; Subculture and consumers Behaviour; Cross-cultural consumers Behaviour; Consumer and e-marketing; Marketing ethics and social responsibility.

MAR-536 Product and Brand Management

Introduction; Concepts of brands; Ownership and use; Brands registration; Loss of brands rights; Infringement; Basics of brands; Selecting brands; Protecting brands; International brands; Owner of brands; brands vs. copyright; Types of brands.

MAR 537 Services Marketing

Introduction; Frameworks for Services; Product catalog service; Marketing mix III: Distribution; Marketing Mix IV: Designing customer service processes; Marketing Mix V: Designing service environment; Marketing Mix VI: Service product; Marketing Mix VII: Managing service personnel; Marketing implementation I: Service Quality; Marketing implementation II: Managing service quality; Marketing implementation III: Growth strategies for service organizations; Services marketing: Integrating customer focus across a firm.

MAR-538 Current Issues in Marketing

Introduction; Intelligent marketing; E-Marketing; Relationship marketing; Customer relationship management; Developing innovative brand communications ; Design of marketing; Marketing services; New trends in marketing; Global marketing: Insights for going international; Marketing for academic and professional careers; applications.

MAR-539 Research Paper: Publish a paper in a refereed scientific journal.

Award of the' Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate.

Master of Business Administration (MBA) Marketing

Master of Business Administration (MBA)
Project Management

Specific Objectives

The programme qualifies the candidates to:

- Communicate professionally to bridge diverse perspectives, cultures, and disciplines in project management.
- Analyze ethical implications in project management.
- Apply quantitative problem-solving methods in project management.
- Assess global opportunities and challenges facing project management growth.
- Behave and collaborate as a project manager.

Expected Learning Outcomes

Upon completion of the programme, successful candidates should be able to:

- Understand the essential elements of a project management foundation.
- Describe the concepts of project life cycle phases and project management process groups.
- Understand and describe all project management processes and applications.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	Human Resources Management	3(2+1)	2	2
PRO-522	Project Management	3(2+1)	2	2
ETP-523	Business Ethics and Social Responsibility	3(2+1)	2	2
MAG-524	Production and Operation Management	3(2+1)	2	2
MEP -525	Entrepreneurship	3(2+1)	2	2

Semester Three

(Three Elective Courses + PRO-531 Strategic Management and PRO-537 Research Paper)

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
PRO-531	Strategic Management	3(2+1)	2	2
PRO-532	Project Management Information Systems	3(2+1)	2	2
PRO-533	Total Quality Management	3(2+1)	2	2
PRO-534	Project Planning and Scheduling	3(2+1)	2	2
PRO-535	Supply Chain Management	3(2+1)	2	2
PRO-536	Projects Feasibility Study	3(2+1)	2	2
PRO-537	Research Paper	3(0+3)	0	6

Courses Contents

ACC-511 Cost and Management Accounting

Introduction; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions

MAR-512 Marketing Management

Market determination; Customer value and satisfaction; Product planning and development; Strategic marketing decisions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution and promotion; Wholesaling and retailing.

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information systems success and failures; Privacy and security of information systems; Ethical and social aspects related to information systems; Information systems departments (ISD).

FIN-514 Financial Management

Introduction; Financial management Objectives; Financial management environment; Interest rates and required rate of returns; Financial statements: taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value(NPV); Internal rate of return (IRR); Modified internal rate of return (MIRR); Payback period; Net present value internal rate of return (IRR); Modified internal rate of return (MIRR); Cash flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling; Development programme; Motivation; Compensation; Turnover programme; Global HRM.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project applications.

ETP- 523 Business Ethics and Social Responsibility

Introduction; Business ethics; Ethics in business; Good life as the goal of ethics; Finding ethics in business; Business values; Ethics and legal professionals; Trust and truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operation Management

Introduction; Location planning; Capacity planning; Facilities layout; Inventory control; Materials required for planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management

MEP-525 Entrepreneurship

Introduction; Entrepreneurial process; Entrepreneurship and creativity; Entrepreneurial assessment; Starting own business; Business plan development; Business plan writing; Presenting business plan; Business problem-solving for Entrepreneur; Marketing plan development; Customer service for new business start up; Basic website development; Advanced website development; Entrepreneurship in practice; Applications: Introduction to eBay®; Developing business opportunities and plans; Taking innovation to market; Financing entrepreneurial operations.

PRO -531 Strategic Management

Introducing; Leading strategically; Examining internal context of strategy; Exploring external environment: Macro and industry dynamics; Crafting business strategy; Crafting business strategy for dynamic contexts; Looking at international strategies; Alliances and cooperative strategies; Employing strategy implementation levers; Employing strategy implementation levers; Strategic management; Internal context of strategy; Exploring external environment; Macro and industry dynamics; Crafting and dynamic business strategy; International strategies; Alliances and cooperative strategies; Implementation of strategies.

PRO-532 Project Management Information Systems

Introduction; Programme and project portfolio management; Project integration management; Project scope management; Projects and team: people, organizations and roles; Managing agreements and documents; Standard and custom reports; Guiding collaboration with policies and workflow diagrams; Information for common understanding prerequisites for collaboration; Cheapest and most reliable way to document and communicate information; Armor for defense against political or legal attacks; A window into project; Improving performance with report cards; Challenges to implementation.

PRO-533 Total Quality Management

Basics of total management; Evolution of quality; Foundations for total quality management; Total quality management (TQM) culture; Preparing for total quality management; Quality problems; Quality certification; TQM performance.

PRO-534 Project Planning and Scheduling

Introduction; Bases for project schedule; Project objectives and scope; Project milestones and budget; Basic network diagramming; Cornerstones of project management; Phases of project management; Scheduling front end; Project recourses availability; Critical path; Project schedule tools; Expanded network diagramming; Bar chat; Assignments.

PRO-535 Supply Chain Management

Introduction; Supply chain management within organizations; Nature of firms; Evolution of supply chain; Role of supply chain management within fortune 500 companies; Design and development of a supply chain network; Measuring and analyzing the value and efficiency of domestic and global supply chains networks; Planning for supply and demand within a supply chain; Economic effect of supply chains within corporate America; Barriers of overall supply chains; Coordination within a supply chain: BMW case; Pricing and revenue management in a supply chain; Major barriers facing supply chains networks in North America.

PRO-536 Projects Feasibility Studies

Introduction; Definition of entrepreneurship; Feasibility analysis process, Opportunity recognition and entrepreneurial research; Creation of ideas-preliminary model; Identify your industry; Market types; Financial research; Competitive analysis; Venture structure and the future; Group presentations.

PRO -537 Research Paper: Publish a paper in a refereed scientific journal.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Business Administration (MBA) Project Management

Master of Business Administration (MBA)
Hospital Management

Specific Objectives

The programme qualifies the candidates to:

- Know roles and responsibilities of health institutions managers.
- Identify processes of management in health institutions
- Comprehend Behaviour of others and innovative management.
- Identify necessary changes and developments in health organizations.

Expected Learning Outcomes

Upon completion of the programme, successful candidates should be able to:

- Analyze ethical implications of business practices using advanced levels of ethical reasoning
- Perform strategic analysis effectively
- Apply quantitative methods to business problem solving
- Assess global opportunities and challenges for business growth
- Evaluate the legal, social, and economic environments of hospital management.
- Apply decision-support tools to hospital management decision making.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	Human Resources Management	3(2+1)	2	2
PRO-522	Project Management	3(2+1)	2	2
ETP-523	Business Ethics and Social Responsibility	3(2+1)	2	2
MAG-524	Production and Operation Management	3(2+1)	2	2
MEP-525	Entrepreneurship	3(2+1)	2	2

Semester Three

(Three Elective Courses + HOS-531 Strategic Management and HOS-538 Research Paper)

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HOS -531	Strategic Management	3(2+1)	2	1
HOS-532	Supply Chain Management	3(2+1)	2	1
HOS-533	Total Quality Management	3(2+1)	2	1
HOS-534	Health Care Management	3(2+1)	2	1
HOS-535	Health Crisis Management	3(2+1)	2	1
HOS-536	Health Insurance and Social Security	3(2+1)	2	1
HOS-537	Computer Applications in Hospital Management	3(2+1)	2	1
HOS-538	Research Paper	3(0+3)	0	6

Courses Contents

ACC-511 Cost and Management Accounting

Introduction to management accounting; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions

MAR-512 Marketing Management

Market determination; Customer value and satisfaction; Product planning and development; Strategic marketing decisions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution, promotion, Wholesaling and retailing.

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information system success and failure; Privacy and security of information systems; Ethical and social aspects related to information system; Information system departments (ISD).

FIN-514 Financial Management

Introduction; Objectives of financial management; Financial management environment; Interest rates and required rate of returns; Financial statements: taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value(NPV); Internal rate of return (IRR); Modified internal rate of return (MIRR); Payback period; Net present value internal rate of return (IRR); Modified internal rate of return (MIRR); Cash flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction to human recourse management; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling; Development programme; Motivation; Compensation; Turnover programme; Global HRM.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project applications.

ETP-523 Business Ethics and Social Responsibility

Introduction to business; Introduction to business ethics; Ethics in business; Good life as the goal of ethics; Finding ethics in business; Business values; Ethics and legal professionals; Trust and truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operation Management

Introduction; Location planning; Capacity Planning; Facilities layout; Inventory control; Materials required for Planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management.

MEP-525 Entrepreneurship

Introduction; Entrepreneurial process; Entrepreneurship and creativity; Entrepreneurial assessment; Starting own business; Business plan development; Business plan writing; Presenting business plan; Business problem-solving for the Entrepreneur; Marketing plan development; Customer service for new business start up; Basic website development; Advanced website development; Entrepreneurship in practice; Applications: Introduction to eBay®; Developing business opportunities and plans; Taking innovation to market; Financing entrepreneurial operations.

HOS -531 Strategic Management

Introducing; Leading strategically; Examining internal context of strategy; Exploring external environment: Macro and industry dynamics; Crafting business strategy; Crafting business strategy for dynamic contexts; Looking at international strategies; Alliances and cooperative strategies; Employing strategy implementation levers; Employing strategy implementation levers. Strategic management; Internal context of strategy; Exploring the external environment: Macro and industry dynamics; Crafting and dynamic business strategy; International strategies; Alliances and cooperative strategies; Implementation of strategies.

HOS -532 Supply Chain Management

Introduction; Within organizations supply chain management; Nature of firms; Evolution of supply chain; Role of supply chain management within fortune 500 companies; Design and development of a supply chain networks; Measuring and analyzing the value and efficiency of a domestic and global supply Chains networks; Planning for supply and demand within a supply chain; Economic effect of supply chains within corporate America case study; Barriers of overall supply chains; Coordination within a supply chain: BMW case; Pricing and revenue management in a supply chain; Major barriers facing supply chain networks in North America; Revision of managing variability within a supply chain network; Trends in markets; Information technology in supply chain management.

HOS-533 Total Quality Management

Introduction; Total management; Evolution of quality; Foundations for Total quality management; TQM culture; Preparing for total quality management; Quality Gurus; Quality problems; Quality certification; TQM performance measurement.

HOS-534 Health Care Management

Introduction; Risk in society; Concept of risk; Chance of loss; Types of insurers and marketing systems; Insurance company operations; Life,insurance and risk. Definition of insurance; Basic characteristics of insurance; Requirements of an insurable risk; Adverse selection and insurance; Benefits and costs of insurance on society; Health insurance; Personal property insurance: homeowner and auto insurance; Insurance market in Hungary; Institutions and insurance business in Hungary; Definition of insurance activities; Insurance companies; Classification of insurance branches; Technical provisions; Social security in Hungary: health insurance; Social security in Hungary: pension system; Application on SPSS.

HOS -535 Health Crisis Management

Introduction; Definitions and concepts of emergency; Emergency management; Form a team; Issue a mission statement; Review internal policies and plans; Identify critical products; Services and operations; Conduct a vulnerability analysis; Estimate probability; Plan components; Identify challenges and prioritize activities; Integrate the Plan into company operations; Emergency management considerations; Emergency Operations Centre (EOC); Communications.

HOS -536 Health Insurance and Social Security

Introduction; Risk in society; Meaning of risk; Chance of loss; Peril and hazard; Types of insurers and marketing systems; Insurance company operations; Life and insurance and risk; Definition of insurance; Basic characteristics of insurance; Requirements of an insurable risk; Adverse selection and insurance; Benefits and costs of insurance on society; Health insurance; Personal property insurance: homeowner and auto insurance; insurance market in Hungary; Institutions and insurance business in Hungary; Definition of insurance activities; Insurance companies; Classification of insurance branches; Technical provisions; Social security in Hungary: health insurance; Social security in Hungary; Applications on SPSS.

HOS-537 Computer Applications in Hospital Management

Introduction; National perspectives and emerging issues; E-prescribing; Disease/Demographic Surveillance Systems; Intro to Excel; Functions of health information systems; Strategic planning; National perspectives: Impacts on professional development and tracking quality of patient care; Case studies in patient-care/ clinical decision-support systems and genomics and others; Ethical and legal issues in health care; Electronic health care records; Research and report writing in health care issues.

HOS -538 Research Paper: Publish a paper in a /refereed scientific journal.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Business Administration (MBA) Hospital Management

Master of Business Administration (MBA)
Finance

Specific Objectives

The programme qualifies the candidates to:

- Know the importance and competitiveness of domestic and international companies.
- Choose appropriate business strategies and policies.
- Examine context of globalization in finance.

Expected Learning Outcomes

Upon completion of the programme, successful candidates should be able to:

- Critically analyze real world financial situations.
- Evaluate, measure risks and formulate action plans to attain strategic financial objectives of the organization.
- Find realistic viable solutions to complex problems.
- Communicate clear and concise financial information for decision making.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	Human Resources Management	3(2+1)	2	2
PRO-522	Project Management	3(2+1)	2	2
ETP-523	Business Ethics and Social Responsibility	3(2+1)	2	2
MAG-524	Production and Operation Management	3(2+1)	2	2
MEP-525	Entrepreneurship	3(2+1)	2	2

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
FIN-531	Strategic Management	3(2+1)	2	2
FIN-532	Corporate Finance	3(2+1)	2	2
FIN-533	Islamic Banking and Finance	3(2+1)	2	2
FIN-534	Financial Institutions and Markets	3(2+1)	2	2

(Three Elective Courses + FIN-531 Strategic Management and FIN-538 Research Paper)

Course Contents

ACC-511 Cost and Management Accounting

Introduction to management accounting; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions

MAR-512 Marketing Management

Market determination; Customer value and satisfaction; Product planning and development; Strategic marketing deci2sions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution, promotion, Wholesaling and retailing.

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information system success and failure; Privacy and security of information systems; Ethical and social aspects related to information system; Information system departments (ISD).

FIN-514 Financial Management

Introduction; Objectives of financial management; Financial management environment; Interest rates and required rate of returns; Financial statements: taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value(NPV); Internal rate of return (IRR); Modified internal rate of return (MIRR); Payback period; Net present value internal rate of return (IRR); Modified internal rate of return (MIRR); Cash flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling; Development programme; Motivation; Compensation; Turnover programme; Global HRM.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project Applications.

ETP- 523 Business Ethics and Social Responsibility

Introduction to business; Introduction to business ethics; Ethics in business; Good life as goal of ethics; Finding ethics in Business; Business values; Ethics and legal professionals; Trust and truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operation Management

Introduction; Location planning; Capacity Planning; Facilities layout; Inventory control; Materials required for Planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management.

MEP-525 Entrepreneurship

Introduction; Entrepreneurial Process; Entrepreneurship and creativity; Entrepreneurial assessment; Starting own business; Business plan development; Business plan writing; Presenting business plan; Business problem- solving for the Entrepreneur; Marketing plan development; Customer service for new business start up; Basic website development; Advanced website development; Entrepreneurship in practice; Applications: Introduction to eBay®; Developing business opportunities and plans; Taking innovation to market; Financing entrepreneurial operations.

FIN-531 Strategic Management

Introducing Strategic Management; Leading strategically; Examining internal context of strategy; Exploring external environment: Macro and industry dynamics; Crafting business strategy; Crafting Business Strategy for dynamic contexts; Looking at international strategies; Alliances and cooperative strategies; Employing strategy implementation levers; Employing strategy implementation levers. Strategic Management; Internal Context of strategy; Exploring the external Environment: Macro and industry dynamics; Crafting and dynamic business strategy; International strategies; Alliances and cooperative strategies; Implementation of strategies.

FIN-532 Corporate Finance

Objectives and organization; Financial institutions; Markets; Types of financing: Short and long term loans; Lease finance; Capital structure; Long term finance; Equity financing; Debt financing; Cost of capital; Valuation of stock and bonds; valuation of stock, Valuation of stock and bonds; Risk and return; Dividend policy.

FIN-533 Islamic Banking and Finance

Introduction to Islamic economics; Concept of Islamic finance; Concept of Sharia and Fiqh; Contemporary Islamic economic thought; Basic principles of Islamic law and finance; Principle of ibaḥaaṣliyya; Prohibition of Riba; Gharar and Maisir; Principle of "risk sharing; Evolution and market trends of Islamic banking and finance; Sharia Boards and Corporate Governance, Sharia standards of the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI); Islamic modern finance; Islamic capital markets; Takaful and Re-takaful; Corporate social responsibility; Micro financing; Current issues and challenges in Islamic finance; Outlook.

FIN-534 Financial Institutions and Markets

Introduction;Financial system; Financial institutions; Commercial banks; Specialized banks; Islamic banks; Central bank; Non-bank institutions; Money markets; Capital markets, Financial markets, Foreign exchange markets; International financial institutions; Khartoum stock exchange market.

FIN-535 International Financial Management

Introduction; Global financial Markets; Foreign exchange theory; how forward markets reflect exk pectations of future spot rate? Foreign exchange exposure; Introduce main operating exposures experienced by firms; Financing a global firm; Determinants of financial structure of the foreign subsidiaries; Foreign investments; Managing capital internationally; Measuring equity market performance across borders; International CAPM; Differences between tax systems around the globe.

FIN-536 Portfolio Management

Introduction; Overview of investments and portfolio analysis; Markets for securities and taxes; risk and return; Economic analysis; Industry analysis; Bond analysis; Derivatives; Technical analysis; Portfolio analysis; Portfolio selection; Managed portfolios.

FIN-537 Insurance and Risk Management

Introduction; Concept of risk management; Definitions of risk; General risk relationships; Risk management process; Risk planning; Risk identification; Risk qualification; Risk response planning; Risk monitoring; Risk control; Introduction to concept of insurance.

FIN -538 Research Paper: Publish a paper in a refereed scientific journal.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Business Administration (MBA) Finance

Master of Business Administration (MBA)
Entrepreneurship

Specific Objectives

The programme qualifies the candidates to:

- Identify entrepreneurial opportunities: types of markets.
- Employ technologies to create new markets.
- Invent and develop ideas to invent new products and services.
- Suggest new ways of doing business comprising infrastructures and industries.

Expected Learning Outcomes

Upon completion of the programme, successful candidates should be able to:

- Use analytical and problem-solving skills in decision making.
- Identify differences among global economies, institutions, cultures and their implications on global management.
- Recognize and analyze ethical and legal problems related to business.
- Assume a leadership role as appropriate.
- Produce coherent written statement and oral presentations of complex business issues.
- Acquire knowledge and skills necessary to achieve the set professional goals.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ACC-511	Cost and Management Accounting	3(2+1)	2	2
MAR-512	Marketing Management	3(2+1)	2	2
MIS-513	Management Information Systems	3(2+1)	2	2
FIN-514	Financial Management	3(2+1)	2	2
MOB-515	Organizational Behaviour	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MHR-521	MHR-521	3(2+1)	2	2
PRO-522	PRO-522	3(2+1)	2	2
ETP-523	ETP-523	3(2+1)	2	2
MAG-524	MAG-524	3(2+1)	2	2
MEP-525	MEP-525	3(2+1)	2	2

Semester Three

(Three Elective Courses + ENP-531 Strategic Management and ENP-537 Research Paper)

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
ENP-531	Strategic Management	3(2+1)	2	2
ENP-532	Innovation Management	3(2+1)	2	2
ENP-533	Entrepreneurial Finance	3(2+1)	2	2
ENP-534	Small and Medium Enterprises Management	3(2+1)	2	2
ENP-535	Strategic Alliances	3(2+1)	2	2
ENP-536	New Venture Planning	3(2+1)	2	2
ENP-537	Research Paper	3(0+3)	0	6

Courses Contents

ACC-511 Cost and Management Accounting

Introduction to management accounting; Management accounting and financial accounting; Cost and volume-profit analysis; Break-even analysis for multiple products; Budgeting and budgetary control; Departmental budgets; Capital budgeting; Standard costing; Pricing of products and services; Management accounting and business decisions.

MAR-512 Marketing Management

Market determination Customer value and satisfaction; Product planning and development; Strategic marketing decisions; Marketing of services; Branding packaging and labeling; Product policy; Pricing; Channels of distribution, promotion, Wholesaling and retailing.

MIS-513 Management Information Systems

Concepts of information systems; Managers information needs; Types of information systems: Planning and development; Tools and methods of building information systems, Information system success and failure; Privacy and security of information systems; Ethical and social aspects related to information systems; Information systems departments (ISD).

FIN-514 Financial Management

Introduction; Objectives of financial management; Financial management environment; Interest rates and required rate of returns; Financial statements: taxes, depreciation and cash flow; Risk and rates of return; Future and present value; Ordinary annuity; Annuity due and perpetuity; Effective annual interest rate (EAR); Cost of capital; Payback period; Net present value(NPV); Internal rate of return (IRR); Modified internal rate of return (MIRR); Payback period; Net present value internal rate of return (IRR); Modified internal rate of return (MIRR); Cash flow estimation and risk analysis; Capital structure and leverage; Financial statement analysis; Distributions to shareholders: Dividends and share repurchases.

MOB-515 Organizational Behaviour

Introduction; Individual Behaviour: Personality and values; Individual perception and learning; Motivation and rewards; Decision making; Decision making and ethics, Ethics and conflicts, Negotiations; Communication in teams and with organizations.

MHR-521 Human Recourses Management

Introduction to human recourse management; HRM planning; Job design cycle; Recruitment and selection; Performance management system; Employees counseling; Development programme; Motivation; Compensation; Turnover programme; Global HRM; Presentations.

PRO-522 Project Management

Introduction; Information system project environment; ISPM features; ISPM conflicts; Project communication; Alternate organization structures; Requirement analysis; Software development standards; Project applications.

ETP-523 Business Ethics and Social Responsibility

Introduction to business; Introduction to business ethics; Ethics in business; Good life as the goal of ethics; Finding Ethics in Business; Business values; Ethics and legal professionals; Trust and Truth; Advertising and consumer manipulation; Competition and self-control.

MAG-524 Production and Operation Management

Introduction; Location planning; Capacity Planning; Facilities layout; Inventory control; Materials required for Planning; Project control with PERT/CPM; Behavioural issues in operations management; International issues in operations management; Service operations management; Quality management.

MEP-525 Entrepreneurship

Introduction; Entrepreneurial Process; Entrepreneurship and creativity; Entrepreneurial assessment; Starting own business; Business plan development; Business plan writing; Presenting business plan; Business problem- solving for the Entrepreneur; Marketing plan development; Customer service for new business start up; Basic website development; Advanced website development; Entrepreneurship in practice; Applications: Introduction to eBay®; Developing business opportunities and plans; Taking innovation to market; Financing entrepreneurial operations.

ENP-531 Strategic Management

Introducing Strategic Management; Leading strategically; Examining internal context of strategy; Exploring external environment: Macro and industry dynamics; Crafting business strategy; Crafting Business Strategy for dynamic contexts; Looking at international strategies; Alliances and cooperative strategies; Employing strategy implementation levers; Employing strategy implementation levers.

ENP-532 Innovation Management

Introduction; Context of innovation and role of the state; Managing intellectual property; Building innovative organization; Sources of innovation; Innovation networks; Decision making under uncertainty; Developing an innovation strategy; Managing organizational knowledge; Managing R&D projects; Managing a new product development team; Group project presentations; Exploiting new ventures; Capturing benefits of innovations.

ENP-533 Entrepreneurial Finance

Introduction; Concepts of valuation for entrepreneurial ventures and possible funding sources Types of investments and planning horizons; Opportunities from funder view point; Management of teams and funders; Model opportunities; Relevant capital structures; Value options; Examine VC funding work; Funding rounds and business of funding; Challenges of managing and funding growth; Term sheets and concept of Due Diligence; Liquidity events: Initial public offerings, sales and mergers; Examine latest stage financing: mezzanine financing and buy-outs; International growth; Corporate and strategic venture funds.

ENP-534 Small and Medium Enterprises Management

Introduction; Legal status of small and medium size enterprises; EU classification of SMEs; Creation of small and medium size enterprises; EU classification of SMEs Financial needs and resources of small and medium-sized enterprises, Personal particulars of the operation of small and medium size enterprises; Transfer obligations of SMEs; Supporting institutes for development of small and medium size enterprises in the Slovak Economic information system for the needs of small and medium-sized enterprises; Position of SMEs in the area of SR.

ENP-535 Strategic Alliances

Strategic management process and concepts; value of vision; mission and corporate objectives; Role of corporate governance and stakeholder management; Coherence in strategic direction; External analysis; Porter's Five Forces model; General environment; Competitive environment; National environments; Creating environmentally aware organization; Internal analysis; Value chain analysis; Resource-based view of a firm; Evaluation of firm performance; Balanced scorecard; Main definitions and classifications; Competitiveness at macroeconomics level; Directions of macro competitiveness research; Factors determining an economy competitiveness potential; Rankings of international competitiveness of countries; Global Competitiveness Report; Main competitive strategies; Competitiveness of enterprises (theoretical issues); Types and sources of competitive advantages of enterprises; Potential and general characteristics of strategic alliances: Case studies, Typology of alliances II: Common integra-

tion, pseudo-concentration, complementary; Global network corporation.

ENP-536 New Venture Planning

Introduction; Importance of project planning; Elements of project planning; Project scope plan; Delivery schedule planning; Team building and planning; developing business plan; Planning and grant writing; Doing the project; Outcomes evaluation and assessment; Methodology of planning and project management; Stakeholder requirements; Technological and epistemological assumptions and methodological aspects in designing a new applications and services; Life cycle services applications; Risk analysis in development of services and applications;Brainstorming; Gordon's method; Implementation new systems for services and applications; Use of soft ware tools; Comprehensive Planning.

ENP-537 Research Paper: Publish a paper in a refereed scientific journal.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Business Administration (MBA) Entrepreneurship

Faculty of Medical Laboratory Sciences
M.Sc. Medical Laboratory Sciences

General Introduction

Medical Laboratory Scientists play a pivoting role in health care. They provide invaluable information for diagnosis, treatment and prevention of diseases. Though so important, the Medical Laboratory sector in Sudan experiences an acute shortage in qualified staff complying with the continuous advances and innovations in medical technologies vis-a-vis instrumentations and procedures.

For this, the Faculty of Medical Laboratory Sciences of the National University provides master programme by course in:

- Haematology and Immuno Haematology
- Histopathology and Cytology
- Microbiology and Infection control
- Parasitology and Medical Entomology
- Chemical Pathology

General Objective

To qualify critical mass of Medical Laboratory staff to work in universities, research centres and in health care units.

Human Resources and Facilities

Teaching staff: Three assistant professors, three lecturers, two technologists, one lab assistant.

Facilities: Three lecture rooms: 70 seats each, haematology lab: 60 seats,university main library: 400 seats, E. Library: 250 seats.

Duration of the Programme: Three semesters: 16 weeks each

Teaching Modules: Lectures, small group discussions, seminars and journal club, practical, residential field training, tutorials and assignments

Teaching Language: English

Examinations Regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- Each student shall conduct a supervised piece of research.
- Duration of the research shall be 16 weeks. If need be, an extension of 4 weeks is allowed if approved by the programme coordinator.
- Exceeding the aforementioned period (four weeks) the student has to settle a one semester extra fees to allow her/him an extention of extra four weeks.

- Expiring the extension periods without completing the dissertation, the student shall be dismissed from the programme.
- A student scoring less than 60% in the dissertation oral examination will be allowed only one chance for oral defence. In such case the student should settle one semester fees.
- All students shall sit for an oral examination at the end of semester three.

Assessment: Continuous assessment: 30%, final examination: 70%

Grading System: A^+ (≥ 85) A(80 - 84) B^+ (70 - 79) B (65 - 69) C (60-64) F (60<)

M.Sc. Medical Laboratory Sciences
Haematology and Immunohaematology

Specific Objectives

The programme qualifies the candidates to:

- Conduct advanced haematological tests for diagnosis and follow up of blood disorders.
- Run advanced coagulation tests to diagnose bleeding and thrombotic disorders.
- Perform all the serological tests necessary to provide safe blood and blood products.
- Perform blood fractionation.

Learning Outcomes

Upon graduation from the programme, students will be able to:

- Train and transfer knowledge to staff working in the laboratory settings
- Upgrade and efficiently manage the laboratory.
- Provide accurate diagnosis of blood
- Assure quality and abide by regulations of laboratory services.
- Write research proposals, conduct and evaluate the research projects in the field of Haematology and Immun Haematology.

Admission Requirements

- Applicants must satisfy the general regulations set by the Faculty of Graduate Studies and Scientific Research of the National University- Sudan for registration for master degrees.
- Eligible candidates are holders of:

(a) B.Sc. (Honors) Medical Laboratory Sciences in: Haematology with Grade Good (Second Class) at least from the National University or from an equivalent university or a college.

(b) B.Sc. (Honors) Medical Laboratory Sciences in: Haematology with Grade Pass (Third Class) from the National University or from an equivalent university or a college. in addition to at least one qualifying semester.

(c) B.Sc.(General) Medical Laboratory Sciences in Haematology with grade Good (Second Class) at least in addition to:

- One qualifying year certificate with grade Good at least or
- Postgraduate Diploma in Medical Laboratory Sciences in: Haematology with grade good at least from the National University or from an equivalent university or a college.

(d) B.Sc. (General) Medical Laboratory Sciences in Haematology with grade Pass (Third Class) in addition to a Postgraduate Diploma with grade Good at least from the National University or from an equivalent university or a college.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HEM-611	Benign Disorders of White Blood Cells	3(2+1)	2	2
HEM-612	Malignant Disorders of White Blood Cells	3(2+1)	2	2
HEM-613	Red Blood Cells Disorders 1	3(2+1)	2	2
HEM-614	Red Blood Cells Disorders II	3(2+1)	2	2
HEM-615	Hemostatic System	3(2+1)	2	2
HEM-616	Bleeding and Thrombotic Disorders	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HEM-621	Quality Assurance in Haematology	3(2+1)	2	2
HEM-622	Automation in Haematology	3(2+1)	2	2
HEM-623	Blood Transfusion and Stem Cell Therapy	3(2+1)	2	2
HEM-624	Hematological Changes in Systemic Diseases	3(2+1)	2	2
HEM-625	Haematology in Selected Populations	3(2+1)	2	2

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HEM-631	Dissertation	8(0+8)	0	16

Courses Contents

HEM- 611 Benign Disorders of White Blood Cells

Benign white cell disorders and causes; Lab diagnosis and follow-up; Application of the most up-to-date techniques.

HEM- 612 Malignant Disorders of White Blood Cells

Malignant white cell disorders and causes; Lab diagnosis and follow-up; Prognosis with application of the molecular, cytogenetc, cytochemical and immunological techniques.

HEM- 613 Red Blood Cells Disorders I

Red blood cells physiology and pathology; Routine and advanced investigations in diagnosis and follow-up of patients with anemias and other RBCs disorders.

HEM- 614 Red Blood Cells Disorders II

Hereditary and acquired hemolytic anemias; Aplastic anemia and polycythemia: routine and advanced investigations.

HEM- 615 Hemostatic system

Hemostatic mechanism: physiological and anatomical components.

HEM- 616 Bleeding and Thrombotic Disorders

Bleeding and coagulation disorders; Diagnose and monitor cases.

HEM- 621 Quality Assurance in Haematology

General and specific aspects of quality assurance and quality control in haematology lab.

HEM- 622 Automation in Haematology

Principles of cells counters; Use and maintenance of automatic machines in haematology lab ; Interpretation of results

HEM- 623 Blood Transfusion and Stem Cell Therapy

Molecular basis; Biochemical basis; Detection methods of blood group antigens and hemopoietic stem cell biology; Perform compatibility tests prior to blood transfusion, bone marrow and solid organ transplantation.

HEM- 624 Hematological Changes in Systemic Diseases

Hematological manifestations of the systemic diseases: parasitic, bacterial, viral or autoimmunes.

HEM- 625 Haematology in Selected Populations

Specific hematological aspects in pediatrics, geriatrics and pregnancy.

HEM- 626 Molecular Haematology

Genetic and molecular bases of haematology ; Perform molecular diagnosis of hematological disorders.

HEM-631 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Award of the Degree

The Scientific Council of the National University, based on the of recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

M.Sc. Medical Laboratory Sciences : Haematology and Immunohaematology

M.Sc. Medical Laboratory Sciences Histopathology and Cytology

Specific Objectives

The programme qualifies the candidates to prepare tissues and cells for:

- Histopathological and cytological techniques using light microscope.
- Immunological assessment of tissues by immunofluorescence and other immunohistochemical techniques.
- Cytogenetic and molecular techniques.
- Advance techniques in tissue transplantation, cell culture, and in-vitro fertilization principle.

Learning Outcomes

Upon successful completion of the programme, the graduate shall be able to:

- Use basic and advanced histopathological techniques.
- Apply cytogenetic techniques for detection of abnormalities of tissues.
- Perform internal and external quality control in histopathology lab.
- Abide by standards of bio-safety.

Admission Requirements

- Applicants must satisfy the general regulations set by the facultyof graduate studies and scientific research of the National University- Sudan for registration for master degrees.
- Eligible candidates are holders of :

  (a) B.Sc. (Honors) Medical Laboratory Sciences in: Histopathology with grade Good (Second Class) at least from the National University or from an equivalent university or a college.

  (b) B.Sc. (Honors) in Medical Laboratory Sciences in: Histopathology with grade Pass (Third Class) in addition to at least one qualifying semester.

  (c) B.Sc.(General) Medical Laboratory Sciences in Histopathology with grade Good (Second Class) at least in addition to :

  - One qualifying year with grade Good at least or
  - Postgraduate Diploma in Medical Laboratory Sciences in Histopathology (with grade Good at least) from the National University or from an equivalent university or a college.

  (d) B.Sc. (General) Medical Laboratory Sciences in Histopathology with grade Pass (Third Class) in addition to a Postgraduate Diploma with grade Good at least from the National University or from an equivalent university or a college.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HIS-611	Histopathological Techniques	3(2+1)	2	2
HIS-612	Advanced Histopathological Techniques	3(2+1)	2	2
HIS-613	Immunohistochemisrty Techniques	3(2+1)	2	2
HIS-614	Immunofluorescent Techniques	3(2+1)	2	2
HIS-615	Cytology and Cytological Techniques in Non-Gynecology	3(2+1)	2	2
HIS-616	Cytology and Cytological Techniques in Gynecology	3(2+1)	2	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HIS-621	Histopathological Diagnosis	4(3+1)	3	2
HIS-622	Cytogenetic and Molecular Techniques	4(3+1)	3	2
HIS-623	Tissue Transplantation Technology	4(3+1)	3	2
HIS-624	Cell Culture Technology	2(1+1)	1	2
HIS-625	Stem Cell Culture Technology	2(1+1)	1	2
HIS-626	In-vitro Fertilization Technology	2(1+1)	1	2

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HIS-631	Dissertation	8(0+8)	0	16

Courses Contents

HIS-611 Histopathological Techniques

Tissue preparation for light microscopy; Histological preparations; Procedure of biopsy: grossing, fixation, processing, embedded, microtome sectioning; Preparation of routine stain heamatoxylen and eosin for routine work; Microtome sectioning and trouble shooting.

HIS-612 Advanced Histopathological Techniques

Spesial staining techniques and dye to idenentify different tissue disease carbohydrate (mucin,glycogen),connective tissue (fiber and cell), pigments and lipids,nerve system,bone disease. tissue microarray techniques.Demonstration of microorganisms using to confirm the suspected microbial diagnosis.

HIS-613 Immunohistochemisrty Techniques

Localization of proteins in cells of a tissue section; Use of antibodies binding to antigen in biological tissues; Immunohistochemical staining to diagnose abnormal cells in cancerous tumors; Specific molecular markers characteristic of important cellular events proliferation or death.

HIS-614 Immunofluorecent Techniques

Diagnostic application of immunofleurecent in histopathology,qualitative and quantitative detection of specific proteins in cells, culture, tissues, on microbeads and microarrays using fluorescence microscopy.

HIS-615 Cytology and Cytological Techniques in Non-Gynecology

Demonstration of benign and malignant changes on cells in non-gynecology; Cytological techniques used to demonstrate the changes on the cell under different circumstances.

HIS-616 Cytology and Cytological Techniques in Gynecology

Demonstration of benign and malignant changes on the cells in female genital tract; Cytological techniques used to demonstrate the changes on the female genital trract under different circumstances.

HIS-621 Histopathological Diagnosis

Selection of apt techniques for diagnosis of lesions and diseases in various body regions; Microscopic manifestations of acute and chronic inflammation; Appearance of necrosis,fibrosis, cancer, healing and repair.

HIS-622 Cytogenetic and Molecular Techniques

Laboratory techniques and instrumentation for exploring cells genetics: Chromosomes (Cytogenetic), DNA and RNA (Molecular Genetics); Human specimens for investigations : blood, amniotic fluid, bone marrow, tumors and fibroblasts (including fetal tissue); Laboratory tests and procedures to provide critical information for accurate diagnosis, treat and monitor of patient's condition.

HIS-623 Tissue Transplantation Technology

Human organ transplantation; Careful monitoring of donors and recipients; donors / recipients compliance; Donor candidate selection: timing and careful management of patients waiting for transplanting; Rapid tests for evaluation and screening of donated organs. Matching of "extended criteria" of donors with appropriate recipients; Quantifying risks related to receiving organs; Government role in organs transplanting: regulations; support services.

HIS-624 Cell Culture Technology

Cell culture techniques with mammalian cell lines; Cells grown in culture; Methods for transforming and separating cells; Tissue culturing; Cell metabolism; Aging process; Effects of drugs and toxic compounds on the cells: mutagenesis and carcinogenesis.

HIS-625 Stem Cell Technology

Advanced histological techniques and immunocytochemistry; Identification of stem cells in human and animals; Instruction in theory and practical of the Procedures for identifying stem cells in different stages.

HIS-626 In-vitro Fertilization Technology

Core knowledge in the fundamental principles of reproductive science ;and the application of essential laboratory techniques in IVF ; Introduction and definitions; Concepts and principles of reproductive science; Application of essential laboratory techniques in IVF; Procedures for removing ova form ovary; Ova / sperms fertilization procedure in laboratory; Transfer of fertilized embryo (egg) to uterus.

HIS-631 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Award of the Degree

The Scientific Council of the National University, based on the of recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

M.Sc. Medical Laboratory Sciences : Histopathology and Cytology

M.Sc. Medical Laboratory Sciences
Microbiology and Infection Control

Specific Objectives

The programme qualifies the candidates to:

- Describe microorganisms' (bacteria, viruses and fungi) cell structures, nutrient requirements and metabolism.
- Use methods of sterilization and test their efficacy.
- Perform serological tests for diagnosis of bacterial, fungal and viral infections using the available laboratory facilities.
- Isolate and identify the pathogenic microorganisms and test their susceptibility to antibiotics.
- Determine the minimum inhibitory concentrations of antibiotics in body fluids.
- Adopt appropriate safety measures and maintain quality control in microbiology labs.
- Apply infection control programme in hospitals and medical labs.

Learning Outcomes

Upon graduation students will acquire:

- Advanced knowledge on bacteriology, mycology, virology, and immunology.
- Advanced practical skills for specimens' collection, diagnosis and identifying appropriate antibiotics for treatment of infections.
- Basic and advanced knowledge and skills on infection control.

Admission Requirements

- Applicants must satisfy the general regulations set by the faculty of graduate studies and scientific research of the National University- Sudan for registration for master degrees.
- Eligible candidates are holders of:
  - (a) B.Sc. (Honors) Medical Laboratory Sciences in: Microbiology with grade Good (Second Class) at least from the National University or from an equivalent university or a college.
  - (b) B.Sc. (Honors) Medical Laboratory Sciences in: Microbiology with Grade Pass (Third Class) in addition to at least one qualifying semester.
  - (c) B.Sc.(General) Medical Laboratory Sciences in Microbiology with grade Good (Second Class) at least in addition to:
    - One qualifying year with grade Good at least or
    - Postgraduate Diploma in Medical Laboratory Sciences in Microbiology with grade Good at least from the National University or from an equivalent university or a college.
  - (d) B.Sc. (General) Medical Laboratory Sciences in Microbiology with grade Pass (Third Class) in addition to a Postgraduate Diploma with grade Good at least from the National University or from an equivalent university or a college.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MIC-611	Medical Microbiology	3(2+1)	2	2
MIC-612	General Bacteriology	3(2+1)	2	2
MIC-613	Medical Mycology	4(3+1)	3	2
MIC-614	Diagnostic Virology	4(2+2)	2	4
MIC-615	Basic Infection Control	4(4+0)	4	0

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MIC-621	Systemic Bacteriology	4(2+2)	2	4
MIC-622	Clinical Virology	4(4+0)	4	0
MIC-623	Advanced Techniques in Bacteriology	4(2+2)	2	4
MIC-624	Diagnostic Molecular Techniques in Microbiology	2(1+1)	1	2
MIC-625	Advanced Infection Control	4(3+1)	3	2

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MIC-631	Dissertation	8(0+8)	0	16

Courses Contents

MIC-611 Medical Microbiology

History of microbiology, taxonomy, growth, metabolism types of bacteria; Bacterial cell structure and physiology; Basic methods for isolation and identification of bacteria; Methods of sterilization and disinfection

MIC-612 General Bacteriology

New techniques of microbiology: taxonomy, growth, metabolism types of bacteria; Bacterial cell structure and physiology; Basic methods for isolation and identification of bacteria; Methods sterilization and disinfection.

MIC-613 Medical Mycology

Examine the biology of true fungi and other organisms traditionally classified with the fungi: taxonomy, life history traits, ecology, physiology, and pathogenesis; Types of mycoses and evolutionary biology of major classes and orders of fungi; Impact of fungi on humans; Identification of fungi in microbiology lab.

MIC-614 Diagnostic Virology

Definition, morphology, structure, replication, classification, and ways of causing virual diseases; Type of specimens taken for laboratory diagnosis; Methods for isolation of viruses: cell cultures, electron microscopy, serological and molecular.

MIC-615 Basic Infection Control

Sources of infection in the community and health institutions; Medical facilities; Disinfection and sterilization; Hand hygiene; Personal protective equipment; Contagious and contaminating materials; organisms transmitted from contacts with contaminated materials; identifying potential sources of infection in laboratory.

MIC-621 Systemic Bacteriology

Systemic infections; mechanism; path physiology; etiological agents and protocol of diagnosis; Specimens: collection and preservation; diagnosis techniques in bacteriology laboratories.

MIC-622 Clinical Virology

Description of clinical entities; Laboratory diagnosis; Prevention and control of some viral diseases: hepatitis, influenza, herpes, polio-AIDs and association with systemic infections.

MIC-623 Advanced Techniques in Bacteriology

Machines and advanced techniques for isolation and identification of bacteria; Antimicrobial sensitivity tests; Detection of resistant strains; use of molecular techniques for specific isolation of pathogenic bacteria.

MIC-624 Diagnostic Molecular Techniques in Microbiology

Machines and advanced techniques for molecular isolation and identification of microrganisms; Detection of resistant strains using molecular techniques for specific isolation of microganisms

MIC-625 Advanced Infection Control

Sources of infection in communities; Types and sources of spreading pathogens; Outbreaks, surveillance and reporting of diseases; Basic knowledge on epidemiology apply effective infection control.

MIC-631 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Award of the Degree

The Scientific Council of the National University, based on the of recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

M.Sc. Medical Laboratory Sciences : Microbiology and Infection Control

M.Sc. Medical Laboratory Sciences
Parasitology and Medical Entomology

Specific Objectives

The programme qualifies the candidates to:

- Acquire advanced knowledge in Parasitology, Medical entomology, Immunology and Molecular Parasitology.
- Identify human parasites, vectors and their relationships.

Learning Outcomes

Upon graduation from the programme, students will be able to:

- Perform parasitological tests for specimens in Parasitology lab.
- Apply serological and molecular techniques for lab diagnosis of parasites.
- Appropriately handle and manage experimental animals.

Admission Requirements

- Applicants must satisfy the general regulations set by the faculty of graduate studies and scientific research of the National University- Sudan for registration for master degrees.
- Eligible candidates are holders of:

  (a) B.Sc. (Honors) Medical Laboratory Sciences in Parasitology with grade Good (Second Class) at least from the National University or from an equivalent university or a college.

  (b) B.Sc. (Honors) Medical Laboratory Sciences in Parasitology with grade Pass (Third Class) from the National University or from an equivalent university or a college.

  in addition to at least one qualifying semester.

  (c) B.Sc.(General) Medical Laboratory Sciences in Parasitology with grade Good (Second Class) at least in addition to:

  - One qualifying year with grade Good at least or
  - Postgraduate Diploma in Medical Laboratory Sciences in Parasitology with grade Good at leastfrom the National University or from an equivalent university or a college.

  (d) B.Sc. (General) Medical Laboratory Sciences in Parasitology with grade Pass (Third Class) in addition to a Postgraduate Diploma with grade Good at least from the National University or from an equivalent university or a college.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
PAR-611	Biology and Metabolism of Parasites	3 (2+1)	2	2
PAR-612	Protozology	3 (2+1)	2	2
PAR-613	Medical Entomology	3 (2+1)	2	2
PAR-614	Diagnostic Parasitological Techniques I	3 (2+1)	2	2
PAR-615	Experimental Parasitology	3 (2+1)	2	2
PAR-616	Evidence Based Practices in Parasitology	3 (3+0)	3	0

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
PAR-621	Helminthology	3 (2+1)	2	2
PAR-622	Immunoparasitology	3 (2+1)	2	2
PAR-623	Diagnostic Parasitological Techniques II	3 (2+1)	2	2
PAR-624	Advanced Parasitological Techniques	3 (2+1)	2	2
PAR-625	Molecular Parasitology	3 (2+1)	2	2
PAR-626	Epidemiology of Parasitic Diseases	3 (2+1)	2	2

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
PAR-631	Dissertation	8(0+8)	0	16

Courses Contents

PAR-611 Biology and Metabolism of Parasites

Description of the structure of the cellular properties, function and the chemical element of the parasite system especially protozoa; nutrition reproduction and metabolism of parasites and their ability to cause diseases.

PAR-612 Protozology

Epidemiology: pathogenicity and management of protozoan infections; Archaeological evidence of protozoan infections; Biology of protozoan; Mode of transmission of parasitic infections; Diagnosis of protozoan infections; Protozoan infection and immune compromised host; Molecular genetics of malaria; Treatment options for protozoan infections; Mechanisms

of anti-malarial drugs; Drug action and drug resistance; Current and potential approaches for protozoan infections control.

PAR-613 Medical Entomology

Concepts associated with vector-borne diseases and demographic and descriptive epidemiology; Overview of Medical Entomology; Trends in the evolution of arthropod vectors of diseases; Anthropozoonotic diseases; Venonomous arthropods and their associated problems, psychogenic parasitosis; Application of Molecular Biology; Immunology and bioinformatics; Pesticides used in control of vectors; Forensic entomology.

PAR-614 Diagnostic Parasitological Techniques 1

Quality control in parasitology laboratory; Principles of light microscope; Principles of electron microscope; Principles of fluorescent microscope; Smears preparation and examination.

PAR-615 Experimental Parasitology

Handle and dissects lab models; Collection and inoculation of blood and other materials; Vaccination; Drug screening.

PAR-616 Evidence Based Practices in Parasitology

Research evidence; Posing the right questions; Searching the literature; Critical appraisal of the literature; Qualitative research appraisal; Systematic review; Meta-analysis, Developing evidence-based culture; Clinical evidence changeing laboratory practice.

PAR-621 Helminthology

Overview of Medical Helminthology; Biology of helminthes; Patterns of larval development; Epidemiology and conditions leading to helminthic infections; Mode of transmission of helminthes infections; Impact of helminthic infections on human health; Role of immune system in producing the disease in helminthic infections; Tropical pulmonary eosinophilia; Common helminthic infections in children; limpact of helminthes co-infections with other parasitic infections; Diagnosis of helminthes; Diagnosis: light Microscope examination, immunological : ELISA and PCR.

PAR-622 Immunoparasitology

Immuonological events during parasitic infection; Types of immune response and the main antigens of each parasite; cells involved in immune response; Escaping mechanism of the parasite; Immuno-pathology of the parasite; Basis of antigen preparation for parasitological uses; Principles of immunological techniques; Vaccination and prevention mechanism of parasitic infections.

PAR-623 Diagnostic Parasitological Techniques II

Advanced parasitological techniques; cultivation and preservation methods used to diagnose and / or maintain parasites of medical importance.

PAR-624 Advanced Parasitological Techniques

Collection, preservation and transport of specimens; Detection and identification of parasites; Recording results; Fixatives used to preserve parasitic elements in faces; Identification of adult intestinal worms.

PAR-625 Molecular Parasitology

Parasite genome structure and expression; Antigenic variability; genetics epidemiology and host-parasite interactions; Current molecular techniques used for identification of certain parasites: plasmodium, leishmania, trypanosoma, toxoplasma and schistosoma.

PAR-626 Epidemiology of Parasitic Diseases

Definition, nature and uses of epidemiology; Basic epidemiologic concepts; epidemiological terminology; Basic epidemiological studies.

PAR-631 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

M.Sc. Medical Laboratory Sciences : Parasitology and Medical Entomology

M.Sc. Medical Laboratory Sciences
Chemical Pathology

Specific Objectives

The programme qualifies the candidates to:

- Acquire state of the art chemical pathology knowledge
- Develop apt skills to undertake routine quality control in chemical pathology laboratories.
- Generate biological and diagnostic reagents.
- Maintain laboratory equipment in chemical pathology laboratories.

Learning Outcomes

Upon completion of the programme, successful candidate should be able to:

- Apply safety and abide by governmental regulations and standards of medical laboratory practices.
- Operate and maintain laboratory equipment used in chemical pathology labs.
- Assure quality programme in chemical pathology labs.
- Perform routine and advanced biochemical tests in chemical pathology labs.

Admission Requirements

- Applicants must satisfy the general regulations set by the faculty of graduate studies and scientific research of the National University- Sudan for registration for master degrees.
- Eligible candidates are holders of:
  (a) B.Sc. (Honors) Medical Laboratory Sciences in Chemical Pathology with grade Good (Second Class) at least from the National University or from an equivalent university or a college.
  (b) B.Sc. (Honors) Medical Laboratory Sciences in Chemical Pathology with grade Pass (Third Class) in addition to at least one qualifying semester.
  (c) B.Sc.(General) Medical Laboratory Sciences in Chemical Pathology with grade Good (Second Class) at least in addition to:
    - One qualifying year with grade Good at least or
    - Postgraduate Diploma in Medical Laboratory Sciences in Chemical Pathology with grade Good at least from the National University or from an equivalent University or a college.
  (d) B.Sc. (General) Medical Laboratory Sciences in Chemical Pathology with grade Pass (Third Class) in addition to a Postgraduate Diploma with grade Good at least from the National University or from an equivalent university or a college.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
CHM-611	Laboratory Procedures in Chemical Pathology	3(2+1)	2	2

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
CHM-612	Instrumentations in Chemical Pathology	3(2+1)	2	2
CHM-613	Quality Control in Chemical Pathology	3(2+1)	2	2
CHM-614	Body Fluids	3(2+1)	2	2
CHM-615	Biochemical Changes in Metabolic Diseases	3(2+1)	2	2
CHM-616	Biochemical Changes in Renal Diseases	3(2+1)	2	2

Semester Two

Code	Course	Credit Hou rs	Contact hours	
			Lectures	Seminars
CHM-621	Endocrinology and Enzymology	3(2+1)	2	2
CHM-622	Biochemical Changes in Liver and Gastrointestinal Tract Diseases	3(2+1)	2	2
CHM-623	Toxicology, Therapeutic Drugs Monitoring and Tumors Markers	3(2+1)	2	2
CHM-624	Nutritional Assessment: Vitamins and Trace Elements	3(2+1)	2	2
CHM-625	Pregnancy, Inborn Errors of Metabolism and Neonatal Screening	3(2+1)	2	2
CHM-626	Diagnostic Molecular Techniques in Chemical pathology	3(2+1)	2	2

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
CHM-631	Dissertation	8(0+8)	0	16

Courses Contents

CHM-611 Laboratory Procedures in Chemical Pathology

Define chemical pathology terms; Hazards in chemical pathology laboratories; Identify units of measurement; Use of glassware in chemical pathology laboratories; Preparation of solutions from solid substances and from stock solutions; Methods of concentration: molarity, normality and percentage; Methods of collection, storage and transport of specimens in chemical pathology laboratories; Types of anticoagulants in chemical pathology.

CHM-612 Instrumentations in Chemical Pathology

Operating instruments in chemical pathology laboratories; Interpretation of results of: flame spectrophotometer, immunoflourescnce, automated chemical analyzer, electrophoresis, ELISA, PCR, gas analyzers, and chromatography.

CHM-613 Quality Control in Chemical Pathology

Purpose of quality control programme; Steps of quality assurance; Preparation of control materials and standard operating procedures; Documentation of results: calibration, performance, maintenance checks, malfunctions, and corrections.

CHM-614 Body Fluids

Body fluid compartments: composition and measurements; General characteristics of CSF,

synovial, amniotic and peritoneal fluid.

CHM-615 Biochemical Changes in Metabolic Diseases

Measurement and metabolism of carbohydrates, amino acids, proteins and lipids

CHM-616 Biochemical Changes in Renal Diseases

Renal anatomy and physiology; Urine formation; Urinalysis; Abnormalities of renal function: nephritis and nephritic syndromes; Renal failure and renal stones.
CHM-621 Endocrinology and Enzymology Use of enzymes in diagnosis; Classification of enzymes; Enzymatic kinetics; Enzyme profiles in disease: liver, bone, prostate, muscle and heart; Use of enzymes as analytical reagents; Biosynthesis; Chemistry and physiological function of hormones and inborn errors of hormones metabolism; Endocrine glands: hypothalamic-pituitary-adrenal axis, thyroid, parathyroid, adrenal (cortex, medulla) and gonads.

CHM-622 Biochemical Changes in Liver and Gastrointestinal Tract Diseases

Measurement of bilirubi: total protiens, albumin and liver enzymes: ASt, ALT, ALP, GGT and 5NT in liver disorders.

CHM-623 Toxicology, Therapeutic Drugs Monitoring and Tumors Markers

Applied toxicology; Measure of drugs in the blood; Identification of tumors markers types.

CHM-624 Nutritional Assessment: Vitamins and Trace Elements

Classification and functions of vitamins and trace elements; Vitamin deficiency disorders and vitamins overdose; importance of trace elements.

CHM-625 Pregnancy, Inborn Errors of Metabolism and Neonatal Screening

Types, causes and laboratory tests of inborn errors of metabolism; Screening tests of neonates ; laboratory investigations of pregnancy.

CHM-626 Diagnostic Molecular Techniques in Chemical Pathology

Define diagnostic molecular biology; Role of molecular biology in chemical pathology laboratories; Identify molecular techniques in chemical pathology; Applications of molecular techniques in diagnosis of chemical changes in body fluids.

CHM-631 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Award of the Degree

The Scientific Council of the National University, based on the of recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

M.Sc. Medical Laboratory Sciences : Chemical Pathology

Faculty of Medicine
M.Sc. in Bioinformatics

Introduction

Bioinformatics is where computer science and biology join to address and solve basic problems associated with human health, environment and agriculture. Recent developments in the sciences have produced a wealth of experimental data of sequences and three-dimensional structures of biological macromolecules. With the advances of computer and information science, a variety of databases are made available to the public on the Internet. This master programme provides knowledge of Bioinformatics for interpretation of the rapidly expanding biological information. It will empower the students with Bioinformatics tools for reviewing the major scientific databases needed to cater for research problems in biology.

General Objective

Provide apt Bioinformatics knowledge for interpretation of the rapidly expanding biological information and basic concepts of Bioinformatics to identify, seek, establish, maintain and exchange research information in biology.

Specific Objectives

Equip the students with:

- Requisite background in modern biology, Biochemistry, Cell biology, Genetics and Molecular Biology.
- Familiarity in computational methods to address problems in molecular biology.
- Knowledge on storage, retrieval, sharing and use of biological information in core areas of Bioinformatics: multiple sequence alignment, Phylogenetic trees, Genomics, Proteomics etc.
- Skills in applied Bioinformatics: Immunoinformatics, Drug designing and discovery.

Expected Learning Outcomes

Upon successful completion of the programme, the successful candidates should be able to:

- Identity strategies and apply appropriate tools in Bioinformatics.
- Identify topical problems drawn from ongoing research and their applications
- Interpret data related to sequences of nucleotides and amino acids,
- Protein domains and protein structures.
- Develop and implement tools that enable efficient access and management of data.
- Acquire the essential programming skills.
- Demonstrate an understanding of the algorithms used in Bioinformatics

Admission Requirements

Applicants must satisfy the General Regulations set by the Faculty of Graduate Studies and Scientific Research of the National University-Sudan for registration for master degrees.

- Eligible candidates are holders of:

(a) B.Sc. **(**Honors) in: Science, Biotechnology, Agriculture, Medicine, Veterinary Science, Pharmacy, Medical Laboratory Sciences and Dentistry with Grade Good (Second Class) at least from the National University-Sudan or from any other accredited university or a college .

(b) B.Sc. **(**Honors) in: Science, Biotechnology, Agriculture, Medicine, Veterinary Science, Pharmacy, Medical Laboratory Sciences and Dentistry with Grade Pass (Third Class) from the National University-Sudan or from any other accredited university or a college in addition to at least one qualifying semester in Bioinformatics.

(c) B.Sc.(General) in: Science, Pharmacy, Biotechnology, Medical Laboratory Sciences with grade Good (Second Class) at least in addition to one qualifying year in Bioinformatics with grade Good at least or Postgraduate Diploma in Bioinformatics with grade good at least from the National University-Sudan or from any accredited university or a college.

(d) B.Sc.(General) in: Science, Pharmacy, Biotechnology, Medical Laboratory Sciences with grade Pass (Third Class) in addition to a Postgraduate Diploma in Bioinformatics with grade Good at least from the National University-Sudan or from any accredited university or a college.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
BIO-611	Basic Molecular Biology	3(2+1)	2	2
BIO-612	Introduction to Proteomics	3	3	-
BIO-613	Object Oriented Programming	3(2+1)	2	2
BIO-614	Database Management Systems	2(1+1)	1	2
BIO-615	Fundamentals of Algorithm	2(1+1)	1	2

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
BIO-621	Fundamentals of Bioinformatics	3(1+2)	1	4
BIO-622	Computational Structural Biology	4(2+2)	2	4
BIO-623	Alignment and Sequences Analyses	3(2+1)	2	2
BIO-624	Data Mining and Machine Learning	4(2+2)	2	4
BIO-625	Biostatistics	3(2+1)	2	4

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
BIO-631	Immunoinformatics	4(2+2)	2	4
BIO-632	Molecular Modeling and Drug Design	4(2+2)	2	4
BIO-633	Research Methodology	3(3+0)	3	0
BIO-634	Research Paper	4(0+8)	0	8

Courses Contents

BIO-611 Basic Molecular Biology

Genome organization; DNA Structure; Replication, Repair and Recombination; Prokaryotic and Eukaryotic ; Transcription; Post Transcriptional Modifications; Translation and Transport; Mutations; Oncogenes and Tumor suppressor genes

BIO-612 Introduction to Proteomics

Protein structure and function: Amino acids and their properties, Amino acids form polypeptides, Protein structure (four levels of organization), Cellular functions performed by protein; Protein folding and misfolding; Protein-protein interaction

BIO-613 Object Oriented Programming

Java Basics; Multithreading and Communication AWT and Event Handling; BioJava; Introduction to scripting with python; Writing python scripting; Making plot with matplotlib; Scientefic computing with python; Data clustering and classification; Searching and sorting.

BIO-614 Database Management Systems

Introduction to Database Management Systems; Data models; Structured Query Language; Relational Database and Storage; Concurrency control techniques & Information retrieval.

BIO-615 Fundamentals of Algorithms

Computing Algorithms; Sorting, Searching and Strings Matching; Graphs; Trees; Algorithm Design and Analysis.

BIO-621 Fundamentals of Bioinformatics

Introduction to Bioinformatics; Bioinformatics Resources; Open access bibliographic resources and literature databases; Databases; Bioinformatics Softwares and tools; Sequence file formats; Protein and nucleic acid sequence; Submitting DNA Sequence to the Database; Taxonomy and phylogeny; Sequence patterns and profiles.

BIO-622 Computational Structural Biology

Prediction of genes; Primer Design; Proteomics; Xray Crystallography; Predicting Protein

structure and function from sequence; Structure Prediction Strategies (Secondary structure prediction); Protein modeling; Classification and comparison of protein 3D structures; Protein -Protein Interaction; Basic concepts on identification of disease genes (SNP).

BIO-623 Alignment and Sequences Analyses

Sequence Analysis; Scoring matrices; Pairwise sequence alignments; Multiple sequence alignments (MSA); Comparative Genomics; Sequence patterns and profiles; Algorithms for derivation and searching sequence patterns; Taxonomy and phylogeny.

BIO-624 Data Mining and Machine Learning

Introduction, Importance of Data Mining; Primitives and System Architectures; Concept Description and Association Rules; Classification and Prediction; Clustering Methods.

BIO-625 Biostatistics

Introduction to biostatistics: significance and basic concepts; Descriptive statistics: measures of central tendency and dispersion; Introduction to Inference; Sampling Distribution and Confidence intervals; Sampling Variability, Confidence Intervals, and p-values for Means and Differences in Means; Sampling Variability and Confidence Intervals; An Introduction to Hypothesis Testing: The Paired t-Test; Comparing Means among Two (or More) Independent Populations; Measures of Association, Sampling Variability, Confidence Intervals and p-values for Binary Outcomes; Simple Linear Regression; Comparing Proportions Between Two Independent Populations; Non-parametric alternatives: Analysis of Variance; Analyzing categorical data: Coodness-of-fit and Contingency tables

BIO-631 Immunoinformatics

Basics in Immunology**:** Introduction to Immunology, Antigens and Antibodies, Major Histocompatability Complex, Disorders of Human Immune System; Immunoinformatics: Introduction to Immunoinformatics and Immunological Database, Computational vaccinology.

BIO-632 Molecular Modeling and Drug Design

Introduction to Organic Chemistry**:** Atomic and Molecular Structure, Chemical bonding

Conformational analysis, Stereochemistry, Heteroaromatics;

Molecular modeling and Drug design: Introduction to Drug Discovery and Development, Drug targets, Lead Identification and Modification, Computer-Aided Drug Design, Drug Delivery, Pre-clinical and Clinical Testing.

BIO- 633 Research Methodology

Foundations of research methodology and introduction to different types of research**:**

What is research? Finding research gabs, research topic; Proposal writing; Pilot studies; Ethical considerations in Research; Ways of data collection; Obstacles in Research; Scientific writing

BIO-634 Research Paper

Research skills in Bioinformatics: design of experiments, data collection and analysis, scientific writing; Oral presentations; Guided research on specific topics in Bioinformatics.

Human Resources and Facilities

Teaching Staff: One professor, three associate professors, three assistant professors, two lecturers

Facilities: Five lecture rooms: 70 seats each, Eight seminar rooms: 50 seats each, computer laboratory: 250 seats, National University main library: 400 seats, E. Library: 250 seats

Duration of the Programme: Three semesters 16 weeks each,

Teaching Modules :Lectures, tutorials, presentations, seminars, assignments and practical sessions

Teaching Language: English

Examinations Regulations

- Abide by the examinations rules of the General Regulations of the graduate studies of the National University-Sudan
- Each student shall conduct a supervised piece of research and submit a paper.

Assessment: Continuous assessment 30%, final examination 70%

Grading System: A^+ (≥ 85) A (80 - 84) B^+ (70 - 79) B (65 - 69) C (60-64) F (60<)

Award of the Degree

The Scientific Council of the National University-Sudan, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate .

M.Sc. Bioinformatics

M.Sc. Human Clinical Anatomy

Introduction

Human Clinical Anatomy is an advanced postgraduate programme designed for students seeking an in depth understanding of structures and functions of human body using macroscopic, microscopic and radiographic techniques. Sudan witnesses an acute shortage in qualified staff specialized in human anatomy due to a continuous brain drain to the neighboring countries. For this the programme targets qualifying a critical mass of specialists in Human Clinical Anatomy to work in universities, research centres and in forensic medicine facilities. The programme strictly abides by ethics and regulations to conserve the rights and privacies of humans.

General Objective

Bridge the gap in qualified staff in the field of Clinical Human Anatomy.

Specific Objectives

The programme qualifies candidates to:

- Know morphology, organization, and anatomical relations of the human body systems and organs: Gross anatomy.
- Know the structure and development of the human body systems: Histology and embryology
- Identify structures in imaging investigations
- Correlate clinical problems to normal anatomy
- Conduct technical research in human body systems: structures and development.

Expected Learning Outcomes

By the end of the programme, the candidate should be able to:

- Skillfuly dissect human body.
- Interpret and care for anatomical specimens.
- Identify the normal anatomical structures in imaging modalities.
- Identify the histological structures of humans.
- Conduct research, analyze data,organize and interpret results related to human health.
- Follow the development process of the human of critical embryonic period and determine congenital anamolies.

Admission Requirements

- Applicant must satisfy the general regulations set by the faculty of graduate studies and scientific research of National University for registration for master degrees.
- Eligible applicants are:

a) Holders of Bachelors degrees with grade good minmium from the National University or from any other accredited university or a college in the following:

- MBBS.
- Basic Medical Sciences majoring human anatomy
- Veterinary Medicine
- Dentistry
- Nursing
- Radiography
- Physiotherapy
- All eligible candidates should pass an interview and an entry examination.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HCA-611	Principles of Medical Education	2(1+1)	1	4
HCA-612	Cells and Tissues	3(2+1)	2	4
HCA-613	Developmental Anatomy	2(1+1)	1	4
HCA-614	Integumentary System	2(1+1)	1	4
HCA-615	Respiratory System	3(2+1)	2	4

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HCA-621	Musculoskeletal System	3(2+1)	2	4
HCA-622	Cardiovascular and Lymphatic Systems	3(2+1)	2	4
HCA-623	Digestive System	3(2+1)	2	4
HCA-624	Urinary System	2(1+1)	1	4
HCA-625	Reproductive System	2(1+1)	1	4

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HCA-631	Endocrine System	2(1+1)	1	4
HCA-632	Head and Neck	2(1+1)	1	4
HCA-633	Nervous System	6(4+2)	4	8
HCA-634	Special Senses	2(1+1)	1	4

Semester Four

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
HCA-641	Research Methodology	2(1+1)	1	4
HCA-642	Dissection	6(1+5)	1	20
HCA-643	Dissertation	3(0+3)	0	12

Courses Contents

HCA-611 Principles of Medical Education

Principles of learning; Instructional methods and techniques used in university education; Methods of assessment and evaluation of: programme, students and instructors; Problem-based learning; Present lectures in the proper way and observe all aspects mentioned in the seminar evaluation From SC-FR, Issue/Rv. (02/00);_Evaluation: integration of structure, function, dysfunction and rehabilitation; Anatomical and physiological terminologies; Imaging modalities and techniques.

HCA-612 Cells and Tissues

Functions of assigned cell organelles; Major compartments of body fluids; Divisions and components of the body; Four Basic tissues; Structures, features and functions of: epithelial, connective, muscular, and nervous tissues.

HCA-613 Developmental Anatomy

Fertilization and cleavage; Blastocyst: Features and developmental fate; Implantation; Embryogenesis and fate of the three primary germ layers; Embryonic membranes and functions; Placenta formation and function; Changes in maternal anatomy and physiological consequences during pregnancy: teratogenes, congenital and chromosomal abnormalities.

HCA-614 Integumentary System

Organs comprising Integumentary system gross: Histological, ultramicroscopic features and functions; Epidermis layers and cell types; Thick and thin skins; Dermis Structure; Dermal capillary networks; Skin color and pigments; Hair and nails structures.

HCA-615 Respiratory System

Osseous and cartilaginous components of ribs and thoracic vertebrae; Inter-costal muscles and intercostal spaces; Intercostal nerves and vessels; Sternum and its ossification; Diaphragm morphology; Respiratory system anatomical divisions and functions; Internal and external nose; Pharynx; Larynx and its cartilages; Trachea; lung lobes and fissures; Bronchial tree; Alveoli; Pleura: reflections, recesses and spaces; Histological changes from nose to alveolus; Lungs blood and nerve supply ; Lungs lymphatic drainage; Development of respiratory system; Thoracic wall bony landmarks and surface projections.

HCA-621 Musculo-Skeletal System

(a) Bones and Joints :

Typical long bone: blood and nerve supply; Histology of compact and spongy bone; Intramembranous and endochondral ossification; Layers of epiphyseal plate; Adjacent nerves and vessels; Common fractures sites; Interstitial and

(b) Appositional Growth;

Bone remodeling; Sesamoid and sutural bone; Structural categories of joints; Joint mobility; Simple synovial joints and subcategories; Cartelgenous and fibrous joints; Bones and joint imaging.

(c) Muscles:

Functions and properties of muscles tissues; Skeletal muscles: origin and insertion, nerve and blood supply, growth and regeneration; Lever systems; Muscles working in groups; Histology of skeletal, cardiac and smooth muscles.

(d) Vertebral Column:

Typical and atypical vertebrae features; Regions of vertebral column; Number of vertebrae in: cervical, thoracic, lumbar, sacral and coccygeal regions; Intervertebral joints; Intervertebral disc; Major ligaments connecting vertebrae; Normal spinal curve; Vertebral column curvatures; Development of vertebral column; Spinal muscles: superficial, deep layers of the back and cervical region; Vertebral column imaging.

(e) Shoulder Girdle and Upper Limb:

Shoulder girdle components; Upper limb Osseous components: Scapula, humerus, radius, ulna, wrist and hand; Shoulder, elbow, wrist and other joints; Rotator cuff components;, Shoulder and pectoral regions: bones, cartilages, and connective tissues; Muscles responsible for shoulder joint movement and their innervations;

Shoulder girdle and upper limb bones surface projections; Axilla and cubital fossa contents; Brachial plexus: roots, trunks, cords and branches; Arm and forearm muscular compartments: Nerve supply actions and disorders; Upper limb blood supply and lymph drainage; Upper limb imaging.

(f) Pelvic Girdle and Lower Limb

Components of pelvic bones; Proximal femur and hip joint with associated ligaments and joint capsule; Osseous components of femur; Tibia, fibula and foot; Male and female pelvis; Arches of foot; Knee joint structures; Muscles groups in gluteal region: thigh, leg and foot; Surface projections of pelvic girdle and lower limb bones; Lower limb blood supply and lymph drainage; Lower limb imaging; Ankle joint; Femoral triangle and popliteal fossa; Foot layers; Lumbar and lumbosacral plexuses.

HCA-622 Cardiovascular System and Lymphatic System

(a) Cardiovascular System

Heart: Position, borders, surfaces, external and internal features; Atria,ventricles valves and major blood vessels; Heart wall layers; Blood and nerve supply of the heart; Mediastinum boundaries and divisions; Pericardium: Layers, blood and nerve supply and pericardial sinuses; Major arteries and their branches, large veins and their tributaries, Development and congenital anomalies of heart and major blood vessels and circulation; Histology of heart and blood vessels; imaging of cardiovascular system.

(b) Lymphatic System

Lymphatic system structural components and functions; Thoracic and right lymphatic ducts; Location, structure and function of primary and secondary lymph organs; Lymph nodes, lymphatic nodules and lymphatic organs.

HCA-623 Digestive System

Anterior abdominal wall muscles: division, regions and quadrants; Innervation and action of the anterior abdominal wall muscles; Development and gross features of peritoneum; visceral and parietal peritoneum; Peritoneal folds and spaces seen; Digestive tube layers; Oral cavity: boundaries and contents; Tooth structure and types ; salivary glands; esophagus; stomach; small intestine; large intestine, anal canal and anus; Liver and biliary tree; Pancreas and pancreatic duct system; Development of digestive tract and anomalies; Blood supply and lymphatic drainage of gastrointestinal tract.

HCA-624 Urinary System

Urinary organs: location, relations, coverings, internal and external features, innervations, blood supply; kidneys ; ureters; bladder ; urethra; internal and external urethral sphincters; Histology of urinary system; Development and congenital anomalies of the urinary organs; imaging of urinary system.

HCA-625 Reproductive System

Male and female pelvis; Peritoneal reflections around pelvic cavity; Pelvic diaphragm;, Male internal and external genital organs: gonads, prostate, seminal vesicles, ejaculatory duct, scrotum, spermatic cord, penis; Female internal and external genital organs: gonads, uterus, uterine tubes, vagina; Perineum; Development and congenital anomalies of male and female genital systems; Histology of males and females genital system; Reproductive system imaging.

HCA-631 Endocrine System

Endocrine glands: position, relations, blood supply, nerve supply and structure; Hypothalamus; Pituitary; Pineal; Thyroid; Parathyroid; Adrenal; Endocrine portion of the pancreas; Endocrine portions of the gonads; Development and congenital anomalies of endocrine system; Imaging of the endocrine glands.

HCA-632 Head and Neck

Skull and mandible; Cervical vertebrae; Fascia and Triangles of the neck; Root and viscera of the neck; Face and scalp; Boundaries and contents of : temporal, infra-temporal and pterygopalatine fossae; Oral cavity, TMJ and salivary glands; Pharynx; Larynx; Nose; Para-nasal sinuses; eye; ear; Head and neck: blood vessels and nerves; Lymphatic drainage.

HCA-633 Nervous System

Topography of Nervous system; Divisions of nervous system; Development of Nervous system; Histology of Nervous system; Spinal cord; Ascending and descending tracts; Brain stem; Diencephalon; Cortex and cortical areas; Basal ganglion; Cerebellum; Meninges; CSF and ventricular system; Blood supply of brain and spinal cord; Cranial nerves.

HCA-634 Special Senses

Sensation and perception; Sensory modality; Sensory receptors; General and special senses, Structure of ear; Vestibular and cochlear pathway; Eye, eyeball structures and Visual pathway; olfactory epithelium and olfactory pathway; Taste sensation and gustatory pathway

HCA-641 Research Methodology

Research concepts; Types of research; Literature review; Identifying a research problem; Research hypotheses; Writing a research proposal; Design of experiments; Sampling procedures; Data collection and analysis; Interpretation of results; Writing a research report, dissertation or thesis.

HCA-642 Dissection

In-depth dissection of the head and neck, thorax, abdomen, pelvis and perineum, upper and lower limbs on the cadaver; detailed dissection of a specific region of human body on cadavers

HCA-643 Dissertation

Write research proposal; Conduct piece of research: Design of experiments, questionnaire, and Data collection: Organization, analyses, interpretation and presentation; Dissertation writing: Abstract, introduction, literature review, materials and methods, results and discussion, conclusions and recommendations references; Dissertation assessment.

Human Resources and Facilities

Teaching staff: Two professors, three associate professors, three assistant professors, five lecturers, two laboratory technologists

Facilities

Lecture Rooms: One lecture room: 40 seats

Laboratories: Histology lab: 100 seats, dissection room: 100 seats, museum: 40 seats, Conventional and Advanced Imaging lab: 40 seats

Libraries: University main library: 400 seats, e-Library: 250 seats.

Duration of the Programme: 16 months.

Teaching Modules: Lectures, practical, seminars, small group discussions, tutorials, assignments, problem-based sessions, journal clubs

Teaching Language: English

Examinations Regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- Duration of the dissertation is 16 weeks. If need be, an extension of six weeks is allowed on approval of the programme cordinator.
- A student scoring less than 60% in the dissertation oral examination will be allowed only one more chance.
- All students shall sit for oral and dissection examinations at the end of semester three.

Assessment: Continuous assessment 30 %,final examination 70%.

Grading system: A^+ (90-100) A (80-89) B^+(75-79) B (70-74) C^+(65-69) C(60-64) F (<60)

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

M.Sc. Human Clinical Anatomy

Faculty of Clinical and Industrial Pharmacy
Master of Hospital Pharmacy

Introduction

M.Sc. Hospital Pharmacy is an advanced unique programme in Sudan designed for pharmacists working in hospitals and community pharmacies to enhance their clinical pharmacy knowledge and practice skills in applying drug therapies. It deals with the application of drug treatments to patients in hospital or clinical settings. The programme is strictly designed to cater for wise administration of medications to secure and ensure the safety and health of patients.

General Objectives

The M.Sc. Hospital Pharmacy programme prepares students for successfully executing the tasks of hospital pharmacist.

Specific Objectives

The programme is designed to equip the students with:

- Knowledge of characteristics, side-effects, route of administration, interactions, stability and doses of drugs used in hospitals.
- Ability to evaluate a patient's drug use in relation to the pathology.
- Skills of preparation and pharmaceutical formulation of drugs.
- Knowledge of principles of sterilization.

Expected Learning Outcomes

Upon graduation from the programme, students will be able to:

- Choose, prepare, store, compound, and dispense medicines and medical devices.
- Advise healthcare professionals and patients on safe, effective and efficient use of drugs.
- Provide services to patients and health care professionals in hospitals.
- Provide pharmaceutical services for hospitals and hospital pharmacists.
- Manage complex clinical problems.

Admission Requirements

- Applicant must satisfy the general regulations set by the faculty of graduate studies and scientific research of the National University-Sudan for registration for master degrees.
- Eligible candidates are holders of:

(e) B.Sc. (Honors) Pharmacy with Grade Good (Second Class) at least from the National University-Sudan or from any other accredited university or a college

(f) B.Sc. (Honors) Pharmacy with Grade Pass (Third Class) from the National University or from an equivalent university or a college in addition to at least one qualifying semester.

(g) B.Sc.(General) Pharmacy with grade Good (Second Class) at least in addition to:

- One qualifying year (with grade Good at least) or
- Postgraduate Diploma in (with grade good at least) from the National University or from an equivalent university or a college.

(h) B.Sc.(General) Pharmacy with grade Pass (Third Class) in addition to a Postgraduate Diploma with grade Good at least from the National University or from an equivalent university or a college.

(i) Priority is reserved for candidates working in hospitals

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MCH-611	Research Methodology	2(2+0)	2	0
MCH-612	Biostatistics	2(2+0)	2	0
MCH-613	Pharmacoinformatics and Communication Skills	2(2+0)	2	0
MCH-614	Pharmacoepidemiology	2(2+0)	2	0
MCH-615	Molecular Pharmacology	2(2+0)	2	0
MCH-616	Pharmacotherapy in Patient Care	2(2+0)	2	0

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MCH-621	Hospital Pharmacy Services	2(2+0)	2	0
MCH-622	Pharmacoeconomics and Hospital Supply Management	2(2+0)	2	0
MCH-623	Dosage Form Design and Biopharmaceutics	2(2+0)	2	0
MCH-624	Pharmaceutical Chemistry and Analysis	1(1+0)	1	0
MCH-625	Advanced Clinical Pharmacy	2(2+0)	2	0
MCH-626	Current Developments in Health and Biotechnology	1(1+0)	1	0
MCH-627	Clinical Pharmacokinetics and Therapeutic Drug Monitoring	2(2+0)	2	0

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MCH-631	Clerkship of Internal Medicine: Cardiology and Pulmonary	2(1+1)	1	2
MCH-632	Clerkship of Surgery and Critical Care	1(0+1)	0	2
MCH-633	Clerkship of Endocrinology	1(0+1)	0	2
MCH-634	Clerkship of Obstetrics and Gynecology	1(0+1)	0	2
MCH-635	Clerkship of Pediatrics	1(0+1)	0	2
MCH-636	Clerkship of Psychiatric	1(0+1)	0	2
MCH-637	Clerkship of Oncology	1(0+1)	0	2
MCH-638	Clerkship of Total Parenteral Nutrition	1(0+1)	0	2
MCH-639	Clerkship of Extemporaneous Compounding	1(0+1)	0	2

Semester Four

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
MCH-641	Clinical Research	1(1+0)	1	0
MCH-642	Journal Club	1(1+0)	1	0
MCH-643	Dissertation	9(6+3)	6	6

Course Contents

MCH-611 Research Methodology

Introduction to epidemiology; Study design; Bias; Meta-analysis and critical appraisal; Experimental design; Survey methods; questionnaires, interviews, unstructured interviews, focus groups; Sampling and samples sizes; Hypothesis testing; Statistical analysis; Correlations and regression; Chi-square distribution; Analysis of variance and non-parametric statistics; Report writing.

MCH-612 Biostatistics

Variables: definition, types: dependent, independent, confounded; Measurement of variables, validity; Types of validity: internal, constructs validity, external, threats ; Types of research: observational, archival, case study, meta-analysis and critical appraisal; Experimental design: True and quasi-experiments; Survey methods: questionnaires, interviews, unstructured interviews and focus group; Types of samples: purposive, convenience and probability; Hypothesis testing; Statistical analysis; Correlation and regression; Chi-square distribution; Analysis of variance and non-parametric statistics.

MCH-613 Pharmacoinformatics and Communication Skills

Introduction to drug information resources; Query answering and documentation; Critical evaluation of drug information and literature; Primary, secondary and tertiary source; Preparation of written and verbal reports; Establishing drug information centre; Poisons information-organization and information resources; Poisons management in drug dependence and drug abusers:

opiates, cocaine, amphetamine, alcohols, benzodiazepines, barbiturates, tobacco; Evidence base medicines: Formulating clinical questions; searching best evidence, critical appraisal of the evidence, applying evidence to the patients, evaluation; Drug monographs.

MCH-614 Pharmacoepidemiology

Definitions of terms and aims of Pharmacoepidemiology; Outcomes of drug use measure; Systems for testing drug effects in populations; Advantages and disadvantages of Pharmacoepidemiological models; Variations in disease by: time, place and person; Sources of data: incidence, prevalence and others; Causation: bias, confounding and effect modification; Randomized controlled trials; drug trials, cohort studies, case-control studies, cross-sectional studies, hybrid designs, prescription event monitoring; Selected applications of pharmacoepidemiology: hospital pharmacoepidemiology, drug induced birth defects, vaccine safety; concept of risk, relative risk, odds ratio, absolute risk reduction, number to treat, attributable risk; Pharmacoepidemiological methods: Drug utilization review, survey of drug use, case series and reports, Drug use measures: number of prescription, prescribed daily dose, defined daily dose.

MCH-615 Molecular Pharmacology

Drug receptors and cell signaling; Agonist and antagonist action: affinity, efficacy, spare receptors Schild plots, Signal transduction mechanisms: cAMP, IP3, DAG, cGMP/NO; Molecular biology of drug receptors; Receptors structure/function relationship; Molecular biology of ion channels; Pharmacology of smooth muscle and its autonomic input; Mechanisms causing contraction in smooth muscle; Transmitter release from autonomic nerve ganglia; Mechanisms of muscles relaxation; Clinical use of drugs acting on smooth muscles.

MCH-616 Pharmacotherapy in Patient Care

Pharmacotherapy instructions: dosage calculations, adverse reactions, drug interactions, relevant pharmacokinetics, alternative therapies and monitoring parameters; Pathophysiology and treatment of various disease state modules; Specific modules systemic pharmacology: cardiovascular (including, hypertension, chronic cardiac failure, ischemic heart disease, hyperlipidaemia); Musculoskeletal disorders: respiratory (asthma, chronic obstructive pulmonary disease) Gastrointestinal diseases; Hematological disorders; Musculoskeletal: osteoarthritis, rheumatoid arthritis, pain; General medical conditions 1-stroke, atrial fibrillation.

MCH-621 Hospital Pharmacy Services

Health Care Economics; Organization and Management Process; Quantitative Techniques for Management; Pharmacy Services Marketing; Communication and report writing in hospitals; Accounting for decision making; Financial management; Supply chain management; Hospital management control systems; Quality management in hospitals; Health care and insurance; Legal and ethical issues; Hospitals and pharmaceutical management.

MCH-622 Pharmacoeconomics and Hospital Supply Management

Terminology; Costs and outcomes used in pharmacoeconomic evaluations; Methodologies for pharmacoeconomic evaluations: case-minimization, cost benefit, cost effectiveness, cost utility, health insurance and medical insurance; Quality of Life (QOL) and Quality Adjusted Life Years (QALY); Decision analysis; Develop a systematic method for evaluating pharmacoeconomic studies; Management of drug supply and procurement; Managing medicine selection; Treatment

guidelines and formulary manuals; Managing procurement; Quality assurance for pharmaceuticals; Quantifying pharmaceutical requirements; Managing tender processes; Managing distribution; Inventory management; Importation and port clearance; Transport management.

MCH-623 Dosage Form Design and Biopharmaceutics

Routes of drug administration; Concepts of biopharmaceutics; Calculation of drug doses: extemporaneous compounding of simple mixtures, basic physicochemical principles preparation of dosage forms; Introduction to basic facts related to information on liquid and solid materials; Properties of solutions; Principles of solutions formations from solutes and solvents; Factors affecting dissolution process; Disperse systems: colloids, suspensions, and emulsions; Mathematical characterization of absorption, distribution and elimination of drugs; Body compartments: one and two compartments; Pharmakinetics parameters: half-life, T_{max} and C_{max}; Bioavailability of drugs.

MCH-624 Pharmaceutical Chemistry and Analysis

Introduction to techniques of separation; Qualitative and quantitative analysis of pure and formulated drugs: titrimetric assays, UV-Vis spectrophotometry, infrared (IR) spectroscopy, nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry; Major chemical routes of drug degradation; Strategies of drug curtail; Degradation kinetics; Drug shelf-life; Quality control for drugs and drug products: complementary medicines and associated pharmacopoeial requirements.

MCH-625 Advanced Clinical Pharmacy

Accurate and effective communication: building and maintaining effective relationships, limitations and consultation models**;** Medication review in patients with multiple pathology and multiple drugs; Identification, categorization and documentation of care issues and actions; Relevant sources**;** Utilization and limitations of medicines and patient information; Keeping medical records; Clinical management plans; Monitoring response: physical examination, modifying treatment., Use of common diagnostic aids; Legal, regulatory, ethical and professional frameworks; Professional relationships and communication with healthcare professionals and patients; Role and function of team members; Reflective practice: continuous professional development; Drug formularies: definition, purpose of formularies in promoting rational drug use, factors influencing selection of drugs formulary; Methods of implementing drug formularies; Clinical guidelines: definition**,** purpose, advantages, disadvantages and factors influencing validity of clinical guidelines; Guidelines development.

MCH-626 Current Developments in Health and Biotechnology

Emerging public health issues; Emerging pharmaceutical technologies; New human genome project; Genome implication on pharmacotherapy; Novel therapeutic agents for combating infectious disease; Development of novel drug delivery platforms.

MCH-627 Clinical Pharmacokinetics and Therapeutic Drug Monitoring

Maximum and minimum plasma concentration; Selecting The appropriateequation;Interpretation of primary pharmacokinetics parameters and their effect on of plasma drug concentration-time profile; Creatinine clearance; Drugs dialysis; Drug monographs: aminoglycosides, digoxin, carbamazepine, phenytoin…; Absorption and distribution kinetics; Therapeutic regimens; Individualization of therapy; Factors affecting individualization of therapy: variability,

genetics, disease, age, weight and interacting drugs; Concentration monitoring; Distribution kinetics; Metabolite kinetics; Turnover concepts; Pharmacokinetics drug interactions during metabolism and excretion; Assessment of AUC; Urine data for estimation of half-life ; Estimation of absorption kinetics from plasma concentration; Distribution of drugs extensively bound to plasma proteins, Indications for TDM and protocol of TDM; Effect of renal impairment in pharmacokinetics; Effect of hepatic disease on pharmacokinetics.

MCH-631 Clerkship of Internal Medicine: Cardiology and Pulmonary

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-632 Clerkship of Surgery and Critical Care

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-633 Clerkship of Endocrinology

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-634 Clerkship of Obstetrics and Gynecology

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-635 Clerkship of Pediatrics

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-636 Clerkship of Psychiatric

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-637 Clerkship of Oncology

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-638 Clerkship of Total Parenteral Nutrition

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology; Drugs used: modes of action, ADR_s

and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-639 Clerkship of Extemporaneous Compounding

Components of a case history; Principles of therapeutics; Disease major pathological processes; Clinical relevance of biochemical treats; Pathophysiology**;** Drugs used: modes of action, ADR_s and contraindications; Pharmacological and non-pharmacological management of diseases.

MCH-641 Clinical Research

Practice-based clinical research; Writing research project proposals; Ethics in research; Ethical clearance; Qualitative and quantitative researches; Data collection, management and answer clinical questions; Literature review for validity and clinical utility; Use electronic and paper based resources for patient care; Search relevant databases for current best evidence.

MCH-642 Journal Club

Formulate and answer clinical questions; Literature review for validity and clinical utility; Use electronic and paper based resources for patient care; Search relevant databases for current best evidence

MCH-643 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Human Resources and Facilities

Teaching Staff: four professors, two associate professors, ten assistant professors, four lecturers

Facilities : One lecture room: 118 seats, one lecture room: 134 seats, two computer labs: 240 seats, National University library: 400 seats, E- library: 250 seats

Duration of the Programmeme: Four semesters: 16 months,

Teaching Modules: Lectures, tutorials, seminars, workshops and clinical rounds.

Teaching Language: English

Examinations Regulations

a. Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan

Assessment: Written examination 60 %, seminars and tutorials 30 %, assignments and laboratory classes 10 %.

Grading system: A (80-100) B^+ (75-79) B70-74) **)** C^+ (65-69) C (60-65) F (60 <)

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

Master of Hospital Pharmacy.

Faculty of Radiography and Medical Imaging Sciences

Master of Medical Diagnostic Radiography

General Introduction

Medical Diagnostic Radiography and Diagnostic Medical Ultrasound are entry-to-practice programme. They qualify specialists in medical technology and medical sonography (ultrasound sonologists) to provide trusted accurate diagnosis for prevention and treatment of diseases. For this, the programme have adopted hands-on practical learning modules to grantee high quality services.

The modules integrate clinical applications, ultrasound physics, and sonographic identifications of: anatomy, physiology, pathology and patho-physiology of human body.

General Objectives

Qualify critical mass of diagnostic radiography specialists and ultrasound sinologists to work in health care units universities and in research centres.

Admission Requirements

- Satisfy the general regulations set by the Faculty of Graduate Studies and Scientific Research of National University for registration for master degrees.
- Eligible candidates are holders of:

  (a) B.Sc. (Honors) Radiology Sciences: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade Good (Second Class) at least and pass an interview.

  (b) B.Sc. (Honors) Radiology Sciences: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade Pass (Third Class) in addition to at least one qualifying semester.

  (c) B.Sc. (General) Radiology Sciences: Diagnostic Imaging, Nuclear Medicine, and Radiotherapy with grade Good (Second Class) at least in addition to:

  - One qualifying year in Diagnostic Imaging with grade Good at least or
  - Postgraduate Diploma in Diagnostic Imaging with grade Good at least

  (d) Holders of B.Sc. (General) Radiology Sciences: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade Pass (Third Class) in addition to a Postgraduate Diploma in Diagnostic Imaging with Grade Good at least.

Human Resource and Facilities

Teaching Staff: One professor, four associate professors, four assistant professors.two lecturers

Facilities

Rooms: One lecture room: 42 seats

Laboratories: Radiology Lab: 15 seats, hospitals: Alraqi University Hospital; Primary Health care (PHC); Royal Care International Hospital; Dar Elag Hospital; Alribat Teaching Hospital; Omar Sawie Hospital; Military Hospital; Antalya Medical Centre; Alemtiaz Hospital; Alneeleen Diagnostic Centre

Libraries: National University Main Library: 400 seats, e- Library: 250 seats

Duration of the Programmeme: Four semesters: 52 weeks

Teaching Language: English

Teaching Modules: Lectures, Case studies, workshops

Examination Regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- Duration of the dissertation shall be 16 weeks. If need be, an extension of 4 weeks is allowed if approved by the programme coordinator.
- Exceeding the aforementioned period the student has to settle a one semester fees to allow her/him an extension of four weeks.
- Expiring the extension periods without completing the dissertation, the student shall be dismissed from the programme.
- A student scoring less than 60% in the dissertation oral examination will be allowed only one chance for oral defense. In such case the student should settle 50% of one semester fees.

Assessment: Continuous assessment 25%

Mid examination 25%

Final examination 50%

Grading system: A^+ (≥ 85) A (80- 84) B^+79 70-)) B (65-69) C (60-64) F (60 <)

Master of Medical Diagnostic Radiography

Specific Objectives

The programme qualifies the students to:

- Identify the normal and abnormal anatomy patterns in CT and MRI images
- Use CT and MRI instrumentations
- Employ advanced technologies in CT and MRI
- Apply quality control measures in CT and MRI
- Implement strategies to minimize the radiation dose to patients.
- Efficiently communicate with peers and other healthcare colleagues
- Conduct health and health-related researches

Expected Learning Outcomes

Upon completion of the programme, successful graduates should be able to:

- Operate diagnostic radiographic instrumentation to optimize image quality and minimize radiation dose or other potential patient hazards
- Employ protocols and techniques associated with diagnostic and interventional radiographic examinations procedures
- Identify normal and abnormal imaging appearances within current diagnostic radiographic procedures
- Use patient information management systems.

Study Programme

Semester one

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
RAD-511	Advanced Medical Education	1(1+0)	1	0
RAD-512	Applied Anatomy	3(2+1)	2	2
RAD-513	Applied Physiology	2(1+0)	2	0
RAD-514	Applied Pathology	2(2+0)	2	0
RAD-515	CT and MRI Physics and Instrumentation	2(2+0)	2	0

Semester two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
RAD-521	Applications of Computer in Radiology	2(1+1)	1	2
RAD-522	Normal Appearance of CT and MRI Investigation	2(2+0)	2	0
RAD-523	Quality Assurance and Patient Management	2(1+1)	1	2
RAD-524	Cross Sectional Anatomy	2(2+0)	2	0
RAD-525	Radiographic Pathology	2(2+0)	2	0
RAD-526	Ethics in Medical Imaging	1(1+0)	1	0
RAD-527	Clinical Applications of CT and MRI	2(0+2)	0	8

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
RAD-631	CT Scanning Procedures	3(2+1)	2	2
RAD-632	MRI Scanning Procedures	3(2+1)	2	2
RAD-633	Advanced Radiological Procedures	2(2+0)	2	0
RAD-634	Clinical Applications of CT and MRI	4(0+4)	0	12
RAD-635	Research Methodology	2(2+0)	2	0

Semester Four

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
RAD-641	Clinical Applications of CT and MRI	4(0+4)	0	12
RAD-642	Dissertation	4(0+4)	0	8

Courses Contents

RAD-511 Advanced Medical Education

Health profession education; Adult learning theories; Learning outcomes and skills acquisition; Instructional design (models); Instructional design (micro teaching); Formative Assessment; Communication in multidisciplinary teams; Simulation in multidisciplinary teams; Purposeful assessment; Reflection and feedback; Learning portfolios and Mentorship.

RAD-512 Applied Anatomy

Cardiovascular system; lymphatic system; Respiratory system; Digestive system; Urinary system; Peritoneum; Developmental anatomy; Nervous system; General and special senses; Autonomic nervous system.

RAD-513 Applied Physiology

Homeostasis; Body fluid; Cardiac cycle; Cardiac output, blood, respiratory, platelets, renal

physiology, GIT physiology, endocrine physiology, male and female genital physiology.

RAD-514 Applied Pathology

Cell Injury; Apoptosis and Necrosis; Adaptation to cell injury; Acute Inflammation; Sequel of Acute inflammation; Inflammatory mediators; Intracellular accumulation; Chronic Inflammation; Healing and repair; Neoplasia-1; Neoplasia-2; Carcinogenesis; Laboratory diagnosis of cancer; Introduction to genetics.

RAD-515 CT and MRI Physics and Instrumentation

Computed tomography: Physical principle and clinical applications; CT image quality; Image manipulation; Image reconstruction; Image artifact; Pitch; CT dose; Effect CT and MRI machines parameter in image contrast; Quality control in CT and MRI; Physical principles of MRI: Excitation, relaxation and processing; MRI equipment; Pulse sequence-1; Pulse sequence 2; Image quality and contrast; Factors affecting image quality; MRI artifacts; MR safety.

RAD-521 Applications of Computer in Radiology

Introduction to computer and programme flow chart; Computerized tomography image formation; Magnetic resonance image formation; Application of computer in Nuclear Medicine (planner, SPECT and PET); Ultrasound image formation; Introduction to image processing (Digital image, enhancement and texture analysis).

RAD-522 Normal Appearance of CT and MRI Investigation

Introduction; Plane evaluation in CT and MRI; Normal radiographic anatomy CT and MRI of: brain, neck, chest upper abdomen, abdomen, male and female pelvis, knee and ankle joints femur and legs, upper limp, breast upper limb, breast.

RAD-523 Quality Assurance and Patient Management

Definition Quality control; Quality assurance and six sigma; Radiation protection measures in radiology department; of Image quality tests; Parameters to be checked in ultrasound unit;, CT unit, and MRI scanner; Measure Quality in Radiology; Factors causing image problems.

RAD-524 Cross Sectional Anatomy

Introduction; Plan evaluation in human anatomy; Cross section anatomy of: brain, neck, chest, upper abdomen, abdomen, male and female pelvis, knee and ankle joints, femur and legs, upper limp, breast, lower limp.

RAD-525 Radiographic Pathology

General concepts; Making best use of radiology; Acute abdomen, Abdomen and hepatic biliary systems; Bone pathology and tumors; Chest pathology; Cardiovascular pathology; GIT disorder; Haemodynamic disorders; Musculoskeletal; Urinary pathology; Central nervous system pathology; Inflammatory and metabolic disorders; Gynecological pathology.

RAD-526 Ethics in Medical Imaging

Introduction to Ethics; Medico-legal Issues in Radiology; Principle of ethics; ARRT Standards of Ethics; Confidentiality; Informed consent and Negligence.

RAD-527 Clinical Applications of CT and MRI

Equipment and accessories of CT and MRI; Safety and precautions measures in CT and MRI; Warm up (CT); Scheduling cases; Positioning of patient and CT and MRI protocols; Routine investigations and special protocols; Contrast agent of CT and MRI.

RAD-631 CT Scanning Procedures

Introduction to technique; Brain; Chest; Abdomen; Pelvis; Ischemic stroke protocol and soft tissue of neck; Contrast agents; COW (Brain Angio) Sinuses+IAC protocols; CT radiation dose; CT spines and limbs; CT artifacts and Patient's care in CT.

RAD-632 MRI Scanning Procedures

Introduction; Parameters and trade-offs; Head and neck; Chest and mediastinum; Abdomen and liver protocol; Pelvis (Male and Female); Soft tissue of neck MRI; Knee and Ankle MRI; Posterior fossa and internal auditory meatus; PNS; Thyroid and parathyroid gland; MRI safety; MRCP; Cardiac MRI; Breast; TMJ and vascular imaging; Spine; Musculoskeletal; Thymus; Upper and lower limbs.

RAD-633 Advanced Radiological Procedures

Cardiac imaging (CT, MRI); Virtual colonoscopy; Entrography and entroclysis; MRS; FMRI.

RAD-634 Clinical Applications of CT and MRI

Advanced protocol in CT and MRI; CT and MRI angiographic protocols; Cardiac investigations; Pediatric scan.

RAD-635 Research Methodology

General layout of thesis; Definitions and importance of research; Characteristics of research; Classification of health research; Criteria of a research topic and selection; Introduction (problem of the study, objective, significance and overview); Literature review (theoretical background and previous studies); Materials and methods (materials, design, population, sample, method of data collection and analysis, ethical approval); Research proposal; Results; Discussion and conclusions; References citation and bibliography; Central tendency and dispersion; Association; Significance tests; Statistical decision theory.

RAD-641 Clinical Applications of CT and MRI

Diagnostic medical imaging management; CT and MRI routine and advanced Investigations; Emergency CT scan.

RAD-642 Dissertation

Scientific writing of dissertation: Preliminaries; Introduction; Literature Review; Materials and Methods; Results; Discussion; References; Appendices.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate.
M.Sc. Medical Diagnostic Radiography

Master of Diagnostic Medical Ultrasound

Specific Objectives

The programme qualifies the students to:

- Identify the normal and abnormal anatomy patterns in Ultrasound images
- Use Ultrasound instrumentations
- Utilize advanced technologies in Ultrasound
- Apply quality control measures in Ultrasound
- Implement strategies to minimize Ultrasound dose to patients.
- Efficiently teach, learn and communicate with peers and other healthcare colleagues.
- Conduct health and health-related research.

Expected Learning Outcomes

Upon completion of the programme, successful graduates should be able to:

- Provide physician with apt anatomic, pathologic, and/or physiologic reports.
- Record, analyze, and process diagnostic data and other pertinent observations made during the Ultrasound exam.
- Demonstrate appropriate communication skills with patients and colleagues;
- Behave in a professional and ethical manner;
- Apply good health Ultrasound practices.

Study Programme

Semester One

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
US-511	Advanced Medical Education	1(1+0)	1	0
US-512	Applied Anatomy	3(2+1)	2	2
US-513	Applied Physiology	2(1+0)	2	0
US-514	Applied Pathology	2(2+0)	2	0
US-515	Ultrasound Physics and Instrumentation	2(2+0)	2	0

Semester Two

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
US-521	Abdominal Ultrasound	3(3+0)	3	0
US-522	Obstetric Ultrasound	2(2+0)	2	0
US-523	Gynecology Ultrasound	2(2+0)	2	0
US-524	Ultrasound Clinical Practices	4(0+4)	0	12
US-525	Ethics in Medical Imaging	1(1+0)	1	0

Semester Three

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
US-631	Doppler Ultrasound	3(3+0)	3	0
US-632	Musculoskeletal Ultrasound	2(2+0)	2	0
US-633	Small Parts Ultrasound	2(2+0)	2	0
US-634	Ultrasound Clinical Practices	5(0+5)	0	10
US-635	Research Methods	2(2+0)	2	0

Semester Four

Code	Course	Credit Hours	Contact hours	
			Lectures	Seminars
US-641	Ultrasound Clinical Practices	5(0+5)	0	10
US-642	Dissertation	4(0+4)	0	8

Courses Contents

US-511Advanced Medical Education

Health profession education; Adult learning theories; Learning outcomes and skills acquisition; Instructional design (models); Instructional design (micro teaching); Formative Assessment; Communication in multidisciplinary teams; Simulation in multidisciplinary teams; Purposeful assessment; Reflection and feedback; Learning portfolios and Mentorship.

US-512 Applied Anatomy

Cardiovascular system; Lymphatic system; Respiratory system; Digestive system; Urinary system; Peritoneum; Developmental anatomy; Nervous system; General and special senses and autonomic nervous system.

US-513 Applied Physiology

Homeostasis; Body fluid; Cardiac cycle; Cardiac output; Blood; Respiratory; Platelets; Renal physiology; GIT physiology; Endocrine physiology; Male and female genital physiology.

US-514 Applied Pathology

Cell Injury; Apoptosis and necrosis; Adaptation to cell injury; Acute Inflammation; Sequel of acute inflammation; Inflammatory mediators; Intracellular accumulation; Chronic inflammation; Healing and repair; Neoplasia-1; Neoplasia-2; Carcinogenesis; Laboratory diagnosis of cancer **o** Genetic.

US-515 Ultrasound Physics and Instrumentation

Sound waves; Acoustic variables; Speed of sound; Amplitude; Continuous pulsed wave and duty factor; Wave interference; Attenuation; Sound transmission and echo reflection; Terminology associated with image characteristics; Ultrasound transducers; Sound beams; Pulse echo instruments; Principles of pulse echo imaging; Artifacts; Bio-effects and safety.

US-521 Abdominal Ultrasound

Liver; Gall bladder biliary system; Pancreas; Spleen; Appendix; Aorta; Lymphnodes; Urinary bladder; kidney; prostate.

US-522 Obstetric Ultrasound

Early pregnancy (First, second and third trimester); Gestational age (First: CRL, BPD, EDD, GS, MSD, anomalies, Nuchal translucency, blighted ova, molar pregnancy, trisomy, position of gestational sac, ectopic pregnancy, number of GS, luteal cyst, hematomas, Second trimester (number, BPD, FL, AC, HC, EDD); Placenta position; Grading and anomalies; Liquor measurement and amount (polyhydroaminos and oligohydroaminos); IUGR; AFI macro and micro size of fetus; Fetal position and weight equation; Third trimester measures (FL, AC, HC, AC, BPD); Fetal weight at birth; Placenta localization and type of previa; EDD; Fetal biophysical profile; Doppler.

US-523 Gynecology Ultrasound

GYN preparation (TVS,TAS); Urinary bladder as window; Uterus shape; Uterus anomaly; Fibroid; Ectopic pregnancy; Uterus anatomy physiology; Endometrium; Pouch of Douglas; Ovaries anatomy, and physiology and pathology; Grading of follicle and cycle; Ovarian cyst and mass; IUCD positioning and type; Cervix; Biophysical uterine; Doppler.

US-524 Ultrasound Clinical Practices

Knobology of ultrasound; Positioning of patients for ultrasound; Patient preparation for Ultrasound; Normal sonographic appearance of organs: abdomen, obstetrics and gynecological; Examination protocols of abdomen, obstetrics and gynecological; Evaluation of abnormalities; Writing diagnostic reports.

US-525 Ethics in Medical Imaging

Introduction to Ethics; Medico-legal issues in radiology; Principles of ethics; ARRT standard of ethics; Confidentiality; Informed consent and negligence.

US-631 Doppler Ultrasound

Physics of Doppler; Color Doppler; Power Doppler; Blood flow indices measurement; Signal; Carotid; Abdomen; Venous and artery normal and abnormal; DVT; Pathology vacuolar; Vacuolar anatomy and pathology; Renal doppler; Upper and lower venous and artery; Vistula; Sub-clavian shunt; AV Vistula,principle of Echocardiography,basic views and technique of echocardiography.

US-632 Musculoskeletal Ultrasound

Musculoskeletal anatomy; Physiology and pathology; Shoulder; Elbow; wrist; Knee; Ankle and Foot; Pediatric hip joint; Nerves and muscle scan normal and abnormalities.

US-633 Small Parts Ultrasound

Breast; Scrotum; Thyroid; Parathyroid; Penis; Eye; Brain of infant and neonate; Doppler.

US-634 Ultrasound Clinical Practices

Knobology of Doppler ultrasound; Positioning patients for ultrasound; Patient preparation for ultrasound; Normal sonographic appearance of organs: vascular, small parts and musculoskeletal; Examination protocols of vascular, small parts and musculoskeletal; Evaluation of abnormalities; Writing diagnostic reports.

US-635 Research Methods

Layout of thesis; definition and importance of research; Characteristics of research; Classification of health research; Identify a research topic: Introduction (problem of the study, objective, significance and overview), Literature review (theoretical background and previous studies); Materials and methods (materials, design, population, sample, method of data collection and analysis, ethical approval); Research proposal, Results, discussion and conclusion; References citation and bibliography; Central tendency and dispersion; Association; Tests of significance; Statistical decision theory.

US-641 Ultrasound Clinical Practices:

Advanced Doppler and clinical applications of Ultrasound in medicine.

RAD-642 Dissertation

Scientific writing of dissertations: Preliminaries; Introduction; Literature Review; Materials and Methods; Results; Discussion; References; Appendices.

Award of the Degree

The Scientific Council of the National University, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate.

M.Sc. Diagnostic Medical Ultrasound