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PROSPECTUS

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Welcome

Note from The President of NUSU

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01

This is the 5th 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 the 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 19 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 lo-

cal and worldwide, 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 a 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 choose 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 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. They 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

Worldwide, the overall innovations and their modifications stem 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, Prof.Maha Esmeal (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 Tekian, Margaret Uguroglu, Saleh A. Al Damegh, Zeinel Ab-

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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 and the improvements made by Enas Badawi, Eman Khair, and Suha A/Gadir 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 and Bakri A/Karim.

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 manuscripts has been skillfully and patiently carried out by Prof. A Rahman Osman Beeri Former 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 **VISION** 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 achievements, 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 democratic 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, (13) Prospectus and Curricula, (14) Organizational Chart, (15) Committee Structure, (16) Logbooks of students' skills and activities, (17) Year Plans, (18) Academic Calendars, (19) 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 individuals involved 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. Saad Subahi, 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 noticeboards 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 institutions 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. ENTRANCE 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 Sudan, an Afro-Arab 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, maybe 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.

Prot Sudan

Khartoum

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 to students and staff for 18 hours on weekdays 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 pride for the University is the design of its beautiful, environmentally friendly, and durable facilities that support 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 teaching hospital building stands next to the main University block and accommodates over 300 beds with full 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 Training outside the campus 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.

Background

The Faculty of Engineering & Architecture at the National University – Sudan (NUSU–FOEA) aspires to be a leading center of excellence in engineering education, architectural innovation, and applied research both nationally and internationally. It is committed to producing highly competent, ethical, and forward-thinking engineers and architects through rigorous, interdisciplinary training aligned with global standards.

The faculty emphasises design thinking, technological integration, and sustainable development, preparing graduates to address complex challenges in infrastructure, energy, urban planning, and digital systems. Through a curriculum that blends theory with hands-on experience, students are equipped to contribute meaningfully to industry, academia, and society.

NUSU–FOEA fosters a culture of innovation, collaboration, and lifelong learning, encouraging students to engage in real-world projects, industry partnerships, and community development initiatives. The faculty upholds core values such as integrity, excellence, and respect for diversity, and strives to maintain a reputable role in advancing engineering and architectural solutions for a more resilient and equitable future.

Our Vision

The (NUSU–FOEA) aspires to become a premier center of excellence in engineering and architectural education, research, and societal impact, both nationally and internationally. Its goal is to deliver innovative, interdisciplinary training that aligns with global standards and empowers students to become creative, ethical, and solution-oriented professionals.

The faculty is committed to advancing technological innovation, sustainable design, and infrastructure development through evidence-based teaching, applied research, and strong industry engagement. It fosters critical thinking, lifelong learning, and collaborative problem-solving across engineering and architectural disciplines.

By cultivating partnerships with academic institutions, industry leaders, and communities,

NUSU–FOEA aims to contribute meaningfully to national development, environmental resilience, and the global engineering landscape. Upholding values of integrity, excellence, and inclusivity, the faculty strives to shape a generation of professionals capable of designing a smarter, more equitable future.

Our Mission

The NUSU-FOEA is committed to fostering academic excellence, advancing technological innovation, and promoting sustainable development within a dynamic, student-centered learning environment. The Faculty aims to cultivate competent, ethical, and visionary engineers and architects who are dedicated to lifelong learning, creative problem-solving, and socially responsible practice.

Graduates are envisioned as innovative thinkers equipped to address complex engineering and design challenges across diverse contexts, local, regional, and global. Through rigorous education, hands-on experience, and interdisciplinary collaboration, students develop the skills to lead transformative projects in infrastructure, energy, urban planning, and architectural design.

In partnership with industry, government, and communities, the Faculty strives to make meaningful contributions to national development, environmental resilience, and the advancement of engineering and architectural standards in Sudan and beyond.

Our Values

The NUSU-FOEA core values include:

- Commitment to community-centered innovation: We strive to address societal challenges through engineering and architectural solutions that are ethical, sustainable, and responsive to local needs.
- Integrity, honesty, and respect: All actions within the Faculty are guided by truthfulness, transparency, and respect for human dignity, fostering trust and professionalism in every endeavour.
- Equity and inclusivity: We ensure fair treatment for all students, staff, and stakeholders, regardless of ethnicity, appearance, religion, or ideology, creating a welcoming and diverse academic environment.
- Dedication to excellence and accountability: We promote hard work, perseverance, and a culture of responsibility, encouraging students and faculty to pursue excellence while being accountable for their conduct and contributions.
- Collaborative spirit and global outlook: We value teamwork, interdisciplinary collaboration, and international engagement, preparing graduates to thrive in a globally connected engineering and architectural landscape.

- Environmental stewardship and sustainability: We uphold principles of ecological responsibility, integrating sustainable practices into design, construction, and technological innovation.
- Positive institutional image and public trust: We aim to maintain a reputable presence in the community by delivering high-quality education, impactful research, and ethical professional services.

Our Objectives:

- To graduate professionals holding degrees in engineering and architecture who demonstrate technical excellence, ethical integrity, and a strong commitment to sustainable development and community engagement.
- To uphold and promote the values and cultural heritage of Sudan, integrating national identity and ethical principles into the educational philosophy and professional practice of all graduates.
- To enhance engineering and architectural research by leveraging the university's laboratories, digital infrastructure, and interdisciplinary collaboration to address pressing technological and environmental challenges.
- To contribute to community development by offering engineering and design services through university-led initiatives and partnerships with governmental and non-governmental organisations, thereby improving infrastructure and quality of life.
- To participate in the planning and implementation of national development projects, utilising the expertise of faculty members and consultants to support strategic goals in urban planning, energy, transportation, and environmental resilience.
- To promote continuous professional development by organising local and international workshops, seminars, and conferences aimed at advancing the skills and innovation capacity of engineers and architects.
- To ensure access to modern tools and technologies by maintaining state-of-the-art laboratories, design studios, and software resources, in collaboration with industry partners and relevant ministries.

Departments

The Faculty of Engineering & Architecture comprises three harmonised, interrelated departments that collectively form the backbone of engineering and architectural education, research, and professional practice. These departments foster a comprehensive understanding of design, technology, and infrastructure, ensuring that future engineers and architects are well-equipped with the knowledge, skills, and ethical standards essential for excellence in their

fields.

Working synergistically, these departments provide an integrated academic experience that balances theoretical foundations, practical applications, innovation, and community engagement. Their collective goal is to produce competent, creative, and socially responsible professionals ready to meet the evolving demands of engineering and architectural practice both locally and globally.

The departments are:

- Architecture Department
- Civil Engineering Department
- Electrical & Electronics Engineering Department

Department of Architecture

The Department of Architecture is dedicated to advancing design excellence through rigorous education, research, and mentorship. Its faculty of experienced architects and scholars serves as role models, emphasising the integration of creative vision with technical precision and cultural sensitivity.

Rooted in both tradition and innovation, the department fosters a deep understanding of spatial design, environmental responsibility, and urban dynamics. Students are challenged to explore architecture as a multidisciplinary practice, where aesthetics, functionality, and sustainability converge to shape the built environment.

Through studio-based learning, critical discourse, and hands-on projects, the department cultivates future architects who are not only skilled designers but also thoughtful contributors to society. Its commitment to ethical practice, contextual awareness, and lifelong learning ensures graduates are prepared to lead in both local and global architectural landscapes.

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.

Teaching Programmes:

- Core architectural concepts are imparted to students primarily during their design

studio years, where theoretical knowledge is integrated with hands-on practice.

- In the Faculty of Engineering & Architecture, the department leads the Architectural Design course series, beginning in the second year and intensifying through the fourth and fifth years. These courses cover fundamental principles of spatial organisation, form, function, and contextual design, with increasing complexity in urban, institutional, and mixed-use projects.
- The department also conducts the Sustainable Architecture and Environmental Design course, focusing on climate-responsive strategies, energy efficiency, and ecological integration. Students learn to apply passive design techniques, material selection, and environmental analysis tools to real-world challenges.
- Additionally, the department offers the Urban Planning and Theory course, which introduces students to the dynamics of city development, zoning, public space design, and socio-cultural factors influencing urban form.

Research & Innovation:

- Emphasis on applied research to enhance the quality, sustainability, and cultural relevance of the built environment. The department encourages investigations into architectural design methodologies, material technologies, and spatial performance to address real-world challenges in urban and rural contexts.
- Promotes multidisciplinary collaboration across engineering, environmental science, sociology, and digital technologies. Faculty and students engage in joint research projects that explore smart cities, heritage conservation, climate-responsive design, and community-driven planning.
- Supports design research, post-occupancy evaluations, and architectural audits to assess the impact of built spaces on human behaviour, energy consumption, and social equity. These initiatives inform policy, practice, and pedagogy, reinforcing the department's commitment to innovation and evidence-based design.

Department of Civil Engineering

- The Department of Civil Engineering is dedicated to advancing infrastructure excellence through rigorous education, applied research, and professional mentorship. Its faculty of experienced engineers and scholars serves as role models, emphasising the integration of analytical rigour with practical innovation and ethical responsibility.
- Rooted in both foundational engineering principles and emerging technologies, the department fosters a deep understanding of structural integrity, environmental stewardship, and sustainable development. Students are challenged to explore

civil engineering as a multidisciplinary field, where design, materials, and systems converge to shape resilient communities and modern infrastructure.

- Through project-based learning, fieldwork, and collaborative problem-solving, the department cultivates future civil engineers who are not only technically proficient but also socially conscious contributors to national and global development. Its commitment to safety, sustainability, and lifelong learning ensures graduates are equipped to lead in diverse sectors, including construction, transportation, water resources, and urban planning.

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 programs 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.

Teaching Programmes:

- Core civil engineering principles are introduced to students through a blend of theoretical instruction and practical application, particularly during their structural and infrastructure-focused studio courses. These experiences emphasise the integration of design, analysis, and construction methodologies.
- Within the Faculty of Engineering & Architecture, the department leads the Structural Design and Analysis course series, beginning in the second year and advancing through the fourth and fifth years. These courses cover essential topics such as load-bearing systems, material behaviour, and design codes, with increasing complexity in bridges, high-rise buildings, and public infrastructure projects.
- The department also conducts the Sustainable Infrastructure and Environmental Engineering course, which emphasises eco-conscious design, resource efficiency, and resilience. Students explore water management systems, green construction practices, and environmental impact assessments, applying engineering tools to address global sustainability challenges.
- Additionally, the department offers the Transportation and Urban Infrastructure Planning course, introducing students to the planning and design of road networks, transit systems, and urban utilities. The curriculum integrates traffic flow theory, geospatial analysis, and socio-economic considerations to prepare students for holistic infrastructure development.

Research & Innovation:

Emphasis on applied research to improve infrastructure resilience, environmental sustainability, and socio-cultural integration. The department encourages investigations into structural systems, construction materials, geotechnical innovations, and transportation networks to address pressing challenges in both urban and rural development.

Promotes multidisciplinary collaboration across civil engineering, environmental science, urban planning, and data analytics. Faculty and students engage in joint research projects focused on climate-adaptive infrastructure, disaster risk reduction, heritage preservation, and inclusive urban mobility, fostering holistic solutions for evolving societal needs.

Supports performance-based design, lifecycle assessments, and post-construction evaluations to examine the long-term impact of civil infrastructure on safety, resource efficiency, and community well-being. These initiatives inform engineering standards, public policy, and educational frameworks, reinforcing the department's commitment to innovation, sustainability, and evidence-driven practice.

Department of Electrical & Electronics Engineering

The Department of Electrical & Electronics Engineering is dedicated to advancing technological innovation through rigorous education, research, and mentorship. Its faculty of accomplished engineers and scholars serve as role models, emphasising the integration of theoretical insight with practical expertise and ethical responsibility.

Rooted in both classical engineering foundations and cutting-edge advancements, the department fosters a deep understanding of electrical systems, electronic devices, and intelligent technologies. Students are challenged to explore electrical engineering as a multidisciplinary practice, where physics, computation, and design converge to power modern life.

Through lab-based learning, collaborative experimentation, and real-world applications, the department cultivates future engineers who are not only technically adept but also visionary contributors to society. Its commitment to sustainable innovation, global relevance, and lifelong learning ensures graduates are prepared to lead in diverse fields such as energy systems, embedded electronics, telecommunications, and automation.

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.

Teaching Programmes:

- Core electrical and electronics engineering concepts are imparted to students primarily through laboratory-intensive courses, where theoretical foundations are integrated with hands-on experimentation and system design.
- Within the Faculty of Engineering & Architecture, the department leads the Circuit Design and Analysis course series, beginning in the second year and intensifying through the fourth and fifth years. These courses cover fundamental principles of analogue and digital circuits, signal processing, and embedded systems, with increasing complexity in automation, instrumentation, and real-time applications.
- The department also conducts the Renewable Energy Systems and Power Electronics course, focusing on sustainable energy conversion, smart grid technologies, and efficient power management. Students learn to apply simulation tools, design photovoltaic and wind systems, and analyse energy storage solutions in response to global energy challenges.
- Additionally, the department offers the Communication Systems and Electromagnetic Theory course, which introduces students to the principles of wireless communication, antenna design, and signal transmission. The curriculum explores modulation techniques, network protocols, and the socio-technical impact of connectivity in modern society.

Research & Innovation:

- Emphasis on applied research to advance intelligent systems, energy efficiency, and digital connectivity. The department encourages investigations into circuit design, embedded technologies, and power systems to address real-world challenges in industrial automation, renewable energy, and smart infrastructure.
- Promotes multidisciplinary collaboration across engineering, computer science, environmental studies, and telecommunications. Faculty and students engage in joint research projects exploring Internet of Things (IoT), robotics, wireless networks, and energy management systems, contributing to the development of smart cities and sustainable technologies.
- Supports innovation in system modeling, hardware prototyping, and performance evaluation to assess the reliability, scalability, and environmental impact of electrical

and electronic solutions. These initiatives inform industry practices, academic curricula, and national development strategies, reinforcing the department's commitment to evidence-based engineering and technological advancement.

Administartion

Dr. Mudathir A. Fagiri

Faculty Dean

Associate Professor of Electrical & Electronics Engineering

Dr. Sawsan M. Almakawy

Deputy Dean

Assistant Professor of Chemical Engineering

Mrs. Alkhansa DafAllah

Registrar

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PLAN TIMETABLE

The student has to earn 186 credit hours to obtain a B.Sc. degree in Civil engineering. The study program distributed over 10 semesters as follows:

Semester 1 [22 CHs - 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Physics I	PHY111	2	1	2	5	3
Chemistry	CHM 111	2		3	5	3
Calculus I	**MAT111**	**2**	**2**		**4**	**3**
Linear Algebra	MAT 112	2	2	-	4	3
Engineering Mechanics I (Statics)	MAT 113	2	2		4	3
English Language I	ENL111	3	-	-	3	3
Engineering Drawing	GEN 121	1	3		3	2
Sustainable Engineering	SCL 111	2	-	-	2	2
		16	10	5	30	22

Semester 2 [21 CHs - 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Physics II	PHY 121	2	1	2	5	3
Calculus II	MAT 121	2	2	-	4	3
Analytic Geometry	MAT 122	2	2	-	4	3
Engineering Mechanics II (Dynamics)	MAT 123	2	2	-	4	3
Introduction to Computer	COM121	1	-	2	3	2
English Language II	ENL121	2	2	-	4	3
Civil Engineering Drawing	GEN 122	1	3		4	2
Fundamental of Engineer- ing	GEN122	2	-	-	2	2
		14	12	4	30	21

Semester 3 [20 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Technical English for Engineering	ENL 211	2	2		4	3
Engineering Geology	CEN 211	3			3	3
Differential Equations	MAT 211	2	2		4	3
Computer Programming	COM 221	2		3	5	3
Material science	GEN 212	2	-		2	2
Fluid Mechanics I	CEN 212	2	2		4	3
Surveying	CEN 213	2		3	5	3
		15	6	6	27	20

Semester 4 [20 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Vector Analysis	MAT 221	2	2	-	4	3
Introduction to Mechanical Engineering	GEN221	2	2		4	3
Advance Surveying	CEN 221	2		3	5	3
Introduction to Electrical Engineering	GEN 222	2		3	5	3
Fluid Mechanics II	CEN222	2	1	2	5	3
Mechanic of materials I	GEN 223	2	2		4	3
Occupational and Environmental Safety	GEN 223	2			2	2
		14	7	8	29	20

Semester 5 [19 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Statistics and probability	MAT 311	2	2	1	5	3
Structural Analysis I	CEN 311	2	2		4	3
Remote Sensing and GIS	CEN 312	2	1	2	5	3
Concrete Technology	CEN 313	2	-	3	5	3
Construction Engineering	CEN 314	2	-	-	2	2
Mechanics of Materials II	CEN 315	2	2	-	4	3
Engineering Properties of Soils	CEN 316	2	-	1	3	2
		14	7	7	28	19

Semester 6 [16 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Numerical Methods	MAT 321	2	2	1	5	3
Hydraulics	CEN 321	2	1	2	5	3
Reinforced Concrete Design I	CEN 322	2	2		4	3
Water Supply Engineering	CEN 323	2	1		3	3
Structural Analysis II	CEN 324	2	2	-	4	3
Design of Steel Structures	CEN 325	2	2	-	4	3
		12	10	3	25	18

Surveying camp 2 Weeks 120 Hoursequivalent to 8 practical hours.

Semester 7 [18 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Engineering Economics	GEN 411	2			2	2
Reinforced Concrete Design II	CEN 411	2	2		4	3
Hydrology	CEN 412	2	2		4	3
Waste Water Engineering	CEN 413	2		3	5	3
Soil Mechanics	CEN 414	2	1	2	5	3
Highway and Transportation	CEN 415	2	2		4	3
Computer Applications	CEN416	2	-	3	5	3
		14	8	8	30	20

Semester 8 [17 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Research Methodology	GEN 421	2	-		2	2
Ground Water	CEN 421	2	2		4	3
Structural Analysis III	CEN 422	2	2		4	3
Construction Management	CEN 423	2	1	-	3	3
Foundation Engineering	CEN 424	2	2		4	3
Prestressed Concrete	CEN 425	2	2		4	3
Quantity Surveying	CEN 426	1	2		3	2
		14	9		24	19

Semester 9 [15 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Values and Ethics in profession	GEN 511	2	-		2	2
Highway construction and Design	CEN 511	2		3	5	3
Introduction to Finite Element	CEN 512	2	2		4	3
Hydraulic Structures	CEN 513	2	2		4	3
Elective 1	CEN 51	2	2		4	3
Graduation Project	CEN 590		6		6	-
		15	11	3	26	14

Semester 10 [15 CHs- 18 weeks]

Course Title	Code	Contact Hours				CH
		Th.	Tut	Lab	Total	
Irrigation Engineering	CEN 521	2	2	-	4	3
Plastic Analysis and Yield Theory	CEN 522	2	2		4	3
Bridge Design	CEN 523	2	2	-	4	3
Elective 2	CEN 52	2	2	-	4	3
Graduation Project	CEN 590	0	12	-	12	6
		8	20		28	18

COURSE OUTLINES:

Title	*Code*	*Semester/Duration*	*Credits*
PHYSICS I	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 I	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 II	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 111	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 112	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 independence 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
Calculus II	MAT 121	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 122	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
Engineering Mechanics I (Statics)	MAT 113	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
Engineering Mechanics II (Dynamics)	MAT 123	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
MECHANICS OF MATERIAL 1	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	3/Longitudinal	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 DESIGN I	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; ele-

mentary 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). Surveying camp 2 Weeks. 120 Hours equivalent to 8 practical hours.

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 ANALYSIS II	CEN 412	7/Longitudinal	2,2,0

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 Professional Practice	CEN 427	7/Longitudinal	2,0,0

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
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	2,2,0

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	2,2,0

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;

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-	9/Longitudinal	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	2,0,3

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 Semester.

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 for crops, 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.

National University

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Undergraduate & Graduate

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5TH EDITION JULY 2024 - JUNE 2028

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