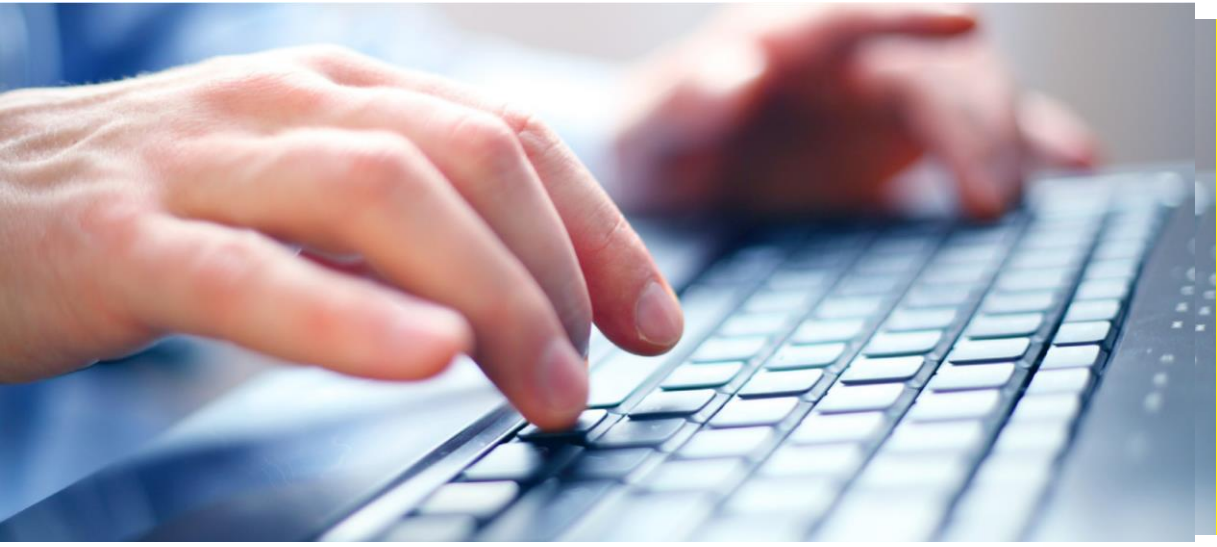
PART II

INFORMATION TECHNOLOGY

National University-
Sudan



VISION AND MISSION

The Vision of Information Technology 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

ENTRANCE REQUIREMENTS

A student interested in joining the Information Technology department, 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: 15000 SDG or US $ 3000 [international students]

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 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 technology in the country.
3. To localize knowledge in the field of information technology in the country.
4. To develop scientific, mathematical and theoretical grounds for the information technology.
5. To provide community service based on conducting scientific studies and applied research in the areas of information technology that have a direct impact on development in the community.
6. To build the information society.
7. Strengthen computer and information technology research, making use of the University's accessibility and communication privileges.

Curriculum Objectives

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A graduate of the National University Information Technology 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 using it effectively in any position in Information systems in companies and organizations.
3. Improve and develop the organizations.
4. Take advantage of the opportunities provided by technology inventions business development and organizations.
5. Analyze, diagnose, and resolve technical issues associated with informatio Technology in organization.
6. Design and manage the organization architecture.
7. Identify and evaluate the solutions needed by the organization.
8. Secure data and technical infrastructure of the organization.
9. Understand and manage the risks of the use of information technology in th organization.
10. Acquire the skills of self-learning, and contribute to availing opportunities fo planning and implementing continuous education activities to upgrade his/he own abilities and those of his/her colleagues in the working team.
11. Conduct scientific research in the field of information technology.

EDUCATIONAL STRATEGIES AND METHODS

Emphasis on learning strategies include: (1) Practice plan to purchase basic skills i information technology and communication, (2) learning student-centred, an responsibility maximum in the learning process of students, and (3) based on problem solving and learning-oriented problem, (4) community-oriented activities of th community and, (5) the integration of basic and community science and practice an training in communications companies and organizations (6) and self-peer teaching an assessment, (7) the team approach, (8) and a wide range of optional, (9) continuou assessment, (10) preparation for continuing education.

Department of Information technology adopt the following methods in the dai programme of activities: (1) (Sessions- learning) based on the solution of problems (2 Seminars and discussions small group (3) Practice in the computer laboratories communications companies and organizations is essential part of the curriculum (4 lectures (5) Educational activities, duties and reporting and research activities (accordin to the nature of the subject) (6) Elective courses

TIMETABLE

The BSc (Honour) Information technology programmes (BSc. IT) requires four years (8 semesters) Study Plan for the program include 172 credit hours Bachelor degree in Information Technology (Honor). Two semesters per academic year,15-18 weeks length 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

Semester 1 [24 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Islamic studies	ISLAM-111	Longit.	2	2	-	3
2	Arabic language	ARAB-112	Longit.	2	2	-	3
3	English language	ENG-113	Longit.	2	2	-	3
4	Calculus	MAT114	Longit.	2	2	-	3
5	Introduction to Information Technology	INT 115	Longit.	2	-	3	3
6	Discrete Mathematics	MAT116	Longit.	2	2	-	3
7	Principles of Economic	HMS117	Longit.	2	2	-	3
8	Principles of Management	HMS118	Longit.	2	2	-	3
			16	16	14	3	24

Repeat courses or examinations for late comers and failures.

Semester 2 [23CHs- 15weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Islamic studies	ISLAM-121	Longit.	2	2	-	3
2	Arabic language	ARAB-122	Longit.	2	2	-	3
3	English language	ENG-123	Longit.	2	2	-	3
4	Sudanese studies	HMS124	Longit.	2	-	-	2
5	Principles of Accounting	HMS125	Longit.	2	2	-	3
6	Principles of Programming	COM126	Longit.	2	-	3	3
7	Computer Equipment and Environments	COM127	Longit.	2	-	3	3
8	Linear Algebra and Geometry	MAT128	Longit.	2	2	-	3
			15	16	10	6	23

Semester 3 [24 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Digital Systems	COM211	Longit.	2	2	-	3
2	Programming Methods	COM212	Longit.	2	-	3	3
3	System analysis and design	SYS213	Longit.	2	2	-	3
4	Multimedia Systems	INT214	Longit.	2	-	3	3
5	Database Concepts	COM215	Longit.	2	-	3	3
6	Statistics & Probability	MAT216	Longit.	2	2	-	3
7	Management information systems	SYS217	Longit.	2	2	-	3
8	Differential Equations	MAT218	Longit.	2	2	-	3
			16	16	10	9	24

Semester 4 [20 CHs- 16 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Communication Skills	HMS221	Longit.	2	2	-	3
2	Human - Computer interaction	INT222	Longit.	2	-	3	3
3	Economic and Forecasting Models	HMS223	Longit.	2	2	-	3
4	Database programming	COM224	Longit.	2	-	3	3
5	Algorithms and Data Structure	COM225	Longit.	2	-	3	3
6	Applied statistic	MAT226	Longit.	2	2	-	3
7	Operational Research	MAT227	Longit.	2	2	-	3
			16	14	8	9	21

Semester 5 [21 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Database Applications	SYS311	Longit.	2	-	3	3
2	Computer Networks and Communications	INT312	Longit.	2	-	3	3
3	Software project management	INT313	Longit.	2	-	3	3
4	Software Engineering(1)	SWE 314	Longit	2	-	3	3
5	Visual Programming	COM315	Longit	2	-	3	3
6	Decision support and Expert Systems	SYS316	Longit	2	2	-	3
7	Internet Technology(1)	INT317	Longit.	2	-	3	3
			18	14	2	18	21

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Semester 6 [21 CHs- 16 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	Network Security	INT323	Longit.	2	-	3	3
4	Reasearch Methodology	HMS324	Longit.	2	2	-	3
5	Internet Technology(2)	INT325	Longit.	2	-	3	3
6	Data Mining	INT326	Longit.	2	-	3	3
7	E-commerce	INT327	Longit.	2	-	3	3
			16	14	2	18	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	Web systems and applications	INT412	Longit.	2	-	3	3
3	Open Source Software & Technologies	INT413	Longit.	2	-	3	3
4	Simulation and modelling	COM414	Longit.	2	-	3	3
5	Elective (1)	INT415	Longit.	2	2	-	3
6	Elective (2)	INT416	Longit.	2	-	3	3
			18	12	4	12	18

Semester 8 [20 CHs- 18 weeks]

	Title	Code	Weeks	Units			CH
				Th	Tut	Prac	
1	Cloud Computing	INT421	Longit.	2	2	-	3
2	Mobile Devices Programming Technologies	INT422	Longit.	2	-	3	3
3	Professional Ethics	HMS423	Longit.	2	-	-	2
4	Elective (3)	INT424	Longit.	2	2	-	3
5	Elective (4)	INT425	Longit.	2	-	3	3
6	Graduation project	INT426	Longit	-	3	15	6
			18	10	7	21	20

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*
Introduction to Information Technology	INT115	1/ Longitudinal	3(2,0,3)

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 basicproblem solving skills and prepares them for taking the programming sequence subjects and other computer science disciplines.

Title	*Code*	*Semester/Duration*	*Credits*
Principles of Management	HMS118	1/ Longitudinal	3(3,0,0)

Introduction , Definition of management, The role of managers, The evolution of management, The origins of management, Scientific management, Human relations management, Operations, information, systems, and contingency management , Organizational Environments and Cultures, External environments, Internal environments, Ethics and social responsibility, Management Functions, A. Planning, (Strategic planning, Tactical planning, Operational planning), B. Organizing, (Corporate-level strategies, Industry -level strategies,Firm - level strategies, Managing human resource systems), C. Leading, (Motivation, Leadership styles, Managing communications), D. Controlling, (The control process, Control methods, Managing information, Managing service and manufacturing operations).

Title	*Code*	*Semester/Duration*	*Credits*
Computer equipment and environment	COM127	1/ Longitudinal	3(2,0,3)

Topic include: workplace health and safety procedures, computer work environment, manual handling techniques for ICT equipment, demonstrate safe use of a PC, pack/unpack and fit static sensitive devices, duties of employers and employees, legal requirement for the use and disposal of hazardous substances, health and safety responsibilities of employees, safety factors to be considered while using a PC, diagnosis

failures of ICT equipment, Apply preventative maintenance to ICT systems

Title	*Code*	*Semester/Duration*	*Credits*
Management Information Systems	SYS213	3/ Longitudinal	3(3,0,0)

Topics include concept of Information Systems: Elements of Information Systems, Classifications of Information Systems; Information Systems in Business Management: End User Information Systems, Office Automation Systems, Electronic Communication Systems, Teleconference Systems, Electronic Printing Systems, Process of Image Systems; Business Information Systems: Marketing Information System, Production Information System, Human Resource Information System, Accounting Information System, Financial Information System; Decision Support Systems: Models of Decision Support Systems, Executive Information System, Artificial Intelligence and Expert Systems; Global Dimensions: Global Data, Security and Ethic Problems in Information Systems, Computer Crime.

Title	*Code*	*Semester/Duration*	*Credits*
Communication Skills	HMS221	4/Longitudinal	3(2,2,0)

Communication paradigms, perceptual processes, personal and professional relationships, description of communication, components of communication process, functions and types of communication, introduction to empathic communication, difference between empty and sympathy, Process of empathic communication, components, skill of listening, improved of emphatic skill, importance of listening and understanding, organizational communication and communication process in organizations, types of communication in organizations, verbal communication, non-verbal communication, Written communication, preparation of CV. The course also includes materials related to verbal and non-verbal communication, communication technology, and the role communication plays in culture.

Title	*Code*	*Semester/Duration*	*Credits*

Applied Statistics	MAT226	4/Longitudinal	3(2,2,0)

Describing data, Simple regressions analyses, and how to interpret the results, Discrete random variables and probability distribution.(Expected values, Variance, covariance,Some common discrete distributions (binomial distribution, etc). Continuous random variables and probability distributions. (Expected values, Variance, covariance, Normal distribution.Hypothesis testing

Title	*Code*	*Semester/Duration*	*Credits*
Software Project Management	INT313	5/Longitudinal	3(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*
Internet Technology-1	INT317	5/Longitudinal	3(2,0,3)

Introduction to HTML Internet, HTML color and links ,Hardware and Software ,HTML Tables, Essentials of Telecommunication HTML Tables, Web Software HTML Frames, Establishing a Web Site Photos and Forms, XML ,Internet Search Tools/CSS, Cascading Style Sheet Web Structure, Cascading Style Sheet Web Page Design, Cascading Style Sheet Web Page Design, Cascading Style Sheet Security

Title	*Code*	*Semester/Duration*	*Credits*
Network Security	INT323	6/Longitudinal	3(2,0,3)

Basic Security Concepts, Confidentiality, integrity, availability, Security policies, security mechanisms, assurance ,Basic Cryptography ,Historical background, Transposition/Substitution, Caesar Cipher, Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, and, Hash functions, Secret Key Cryptography, Data Encryption Standard (DES), Advanced Encryption Standard (AES), Encrypting large messages (ECB, CBC, OFB, CFB, CTR), Multiple Encryption DES (EDE),Public Key Cryptography , Number theory: Euclidean algorithm, Euler Theorem, Fermat Theorem, Totent, functions, multiplicative and additive inverse, RSA, Selection of public and private keys ,Authentication , Basic concepts of identification and authentication, Password

authentication, Authentication protocols, Trusted Intermediaries, Public Key infrastructures, Certification authorities and key distribution centers, Kerberos, Real-time Communication Security , IPsec: AH and ESP , IPsec: IKE , SSL/TLS , Firewall , Auditing and intrusion detection, Miscellaneous topics (1 lecture), Assurance and Evaluation of Secure Information Systems , Database Security (Security requirements in databases, Access control and authorization in databases, Inference control), Malicious software, Administrating Security (Risk Analysis, Security Planning, Organizational Security Policies)

Title	*Code*	*Semester/Duration*	*Credits*
Decision Support Systems	SYS324	6/Longitudinal	3(2,2,0)

The course covers 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*
Internet Technologies-2	INT325	6/Longitudinal	3(2,0,3)

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 datalist 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, Color, 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, Javascript Event handling: Reviewing the load Event, Event mousemove and the event Object, Rollovers with mouseover and mouseout, 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 XMLHttpRequest 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, MySQLand PHP Installation, Microsoft IIS Express and Web Matrix, PHP: Introduction, simple PHP program, converting between data types, arithmetic operators, initializing and manipulating Arrays, String comparision, String Processing with Regular Expressions, Form Processing and Business Logic, Reading from a Database, Using Cookies, Dynamic Content

Title	*Code*	*Semester/Duration*	*Credits*
Web Systems and Applications	INT 412	7/Longitudinal	3(2,0,3)

Part I Basics : Internet and Web Protocols ,Client-Server Architecture ,Web Software. Part II Development Technologies , Active Server Pages,VBscript , Databases,Interfacing with Databases, Web Application Components , Authentication, User Registration , Searching, Uploading content, Emailing , Part III Design Principles Web Application Design , Performance and Reliability , Web Application Infrastructure

Title	*Code*	*Semester/Duration*	*Credits*
Open Source software and technologies	INT 413	7/Longitudinal	3(2,0,3)

Open Source Software: Definitions and History Where Open Source is Successful Open Source: 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 DevelopedManaging 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 cyclelist.

Title	*Code*	*Semester/Duration*	*Credits*
Professional Ethics	HMS422	8/Longitudinal	2(2,0,0)

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
Cloud Computing	INT423	8/ Longitudinal	3(2,2,0)

Cloud Computing Basics-Overview, Applications, Intranets and the Cloud. Your Organization and Cloud Computing- Benefits, Limitations, Security Concerns. Hardware and Infrastructure- Clients, Security, Network, Services. Software as a Service (Saas)- Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA. Platform as a Service (PaaS)-IT Evolution Leading to the Cloud, Benefits of Paas Solutions, Disadvantages of Paas Solutions. Infrastructure as a Service (Iaas)-Understanding IaaS, Improving Performance through Load Balancing, System and Storage Redundancy, Utilizing Cloud-Based NAS Devices, Advantages, Server Types. Identity as a Service (IDaaS)- Understanding Single Sign-On (SSO), OpenID, Mobile ID Management. Cloud Storage-Overview, Cloud Storage Providers.
Virtualization-Understanding Virtualization, History, Leveraging Blade Servers, Server . Virtualization, Data Storage Virtualization. Securing the Cloud- General Security Advantages of Cloud-Based Solutions, Introducing Business Continuity and Disaster Recovery. Disaster Recovery- Understanding the Threats. Service Oriented Architecture-Understanding SOA, Web Services Are Not Web Pages, Understanding Web Service Performance, Reuse and Interoperability. Developing Applications-Google, Microsoft, Cast Iron Cloud, Bungee Connect, Development. Migrating to the Cloud-Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, and Migration. Designing Cloud Based Solutions-System Requirements, Design Is a Give-and-Take Process. Coding Cloud Based Applications-Creating a Simple Yahoo Pipe, Using Google App Engine and creating a Windows Azure Application. Application Scalability-Load-Balancing Process, Designing for Scalability, Capacity Planning Versus Scalability, Scalability and Diminishing Returns and Performance Tuning.

Title	Code	Semester/Duration	Credits
Graduation Project	COM426	8/Longitudinal	6(0,0,18)

Students will identify an actual Information technology 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.

ELECTIVE COURSES

Elective courses determine by the Faculty Management according to the strategic plan.

Title	*Code*	*Semester/Duration*	*Credits*
Knowledge Management	INT4xx	Longitudinal	3(2,0,3)

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, Knowledge Capture Systems, Knowledge Sharing Systems, Knowledge Application Systems, etc.)

Title	*Code*	*Semester/Duration*	*Credits*
Expert Systems	INT4xx	Longitudinal	3(2,0,3)

Introduction to Expert Systems, Knowledge Acquisition, Knowledge Representation, Expert System Tools, LISP, CLIPS, Expert System Implementation, Expert System Testing .

Title	*Code*	*Semester/Duration*	*Credits*
Computer Network Programming	INT4xx	Longitudinal	3(2,0,3)

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*

Modern Trends in Information Technology	INT4xx	Longitudinal	3(2,0,3)

The contents of this course are depending on what topics will be selected. The topics are selected according to the current and updated computer technologies that can help the student in developing his final project. Methods of instruction: this course base on seminars and practical work, students develop new project regarding this new technology, discuss the new topics, and present their projects in seminars.

Title	***Code***	***Semester/Duration***	***Credits***
E-Commerce Advanced Technologies	INT4xx	Longitudinal	3(2,0,3)

Welcome to the course and introduction. B2B issues,Enterprise Resource Planning Interorganisational Communication: Supply Chain & Collaborative Commerce,Interorganisational Communication: Marketing & Ecrm, Next steps E-government: G2B, G2G and G2C, M-Commerce in enterprises, M-Commerce developments.Strategies: multiplatform issues for e-commerce, Strategies: organisational resourcing ,Implementing e-commerce in the enterprise, E-commerce Futures.