University of Information Technology and Communications
جامعة تكنولوجيا المعلومات والاتصالات

Seventh Cycle – Bachelor's Degree (B.Sc.) – Mobile Communications and Computing Engineering

بكالوريوس - هندسة الاتصالات والحوسبة المتنقلة

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1. Overview

This catalogue is about the courses (modules) given by the program of Mobile Communications and Computing Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with (**7500**) total student workload hours and **240** total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الاتصالات والحوسبة المتنقلة للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٨) مادة دراسية، على سبيل المثال، مع (٧٥٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
MAT1	Mathematics I	6.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	6
Description			
Qualifying, training and teaching the student on the properties of matrices and their mathematical applications in the field of physics and engineering and benefiting from them in solving linear systems, as well as studying the types of functions of one variable and how to find ends and continuities, and then studying the most important basics of engineering by explaining derivations, integrations and their applications. The second part of this curriculum, which is the important part in scientific and engineering life, is solving differential equations of the first and second degree, linking them with the rest of the other topics, and explaining several ways to solve this type of differential equations. Mathematics lectures for the first course are given in 3 theoretical hours each week, interspersed with many examples, issues and discussions to clarify the vocabulary of the mathematics curriculum in more detail.			

Module 2

Code	Course/Module Title	ECTS	Semester
DSD1	Digital Systems Design I	6.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
Digital system design is a system in electrical and computer engineering that uses simple number values to produce input and output operations. As a digital design engineer, you may assist in developing cell phones, computers, and related personal electronic devices. This course presents an introduction to logic design and the basic building used in digital systems, number systems, combinational logic, logic gates, minimization technique, arithmetic circuits, Boolean Algebra and logic simplification, Digital Logic Families. At the end of this course the student will be able to perform arithmetic operations in number systems. manipulate Boolean algebra structures. simplify the Boolean expression using Karauagh Map, implement the Boolean Functions using logic gates, analyze, design, verified, and tested various combinational logic circuits.			

Module 3

Code	Course/Module Title	ECTS	Semester
ECT1	Electrical Circuits I	6.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
This course on Electrical Circuits Analysis introduces students to the principles and techniques required to analyze and understand DC circuits. Through a combination of theoretical instruction and practical laboratory sessions, students will develop a strong foundation in circuit analysis. The course covers a range of topics, including fundamental concepts such as voltage, current, and resistance. Students will explore cisrcuit analysis techniques such as Ohm's law, power and energy calculations, and the classification of circuit components. They will gain hands-on experience in analyzing series, parallel, and series-parallel circuits, applying voltage and current divider rules, and understanding power distribution in these circuits. Additionally, students will study Kirchhoff's laws, including Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL), to analyze complex circuits. They will learn practical methods for circuit analysis, such as node-voltage analysis, mesh analysis, and the application of superposition, Thevenin's theorem, and Norton's theorem. The course emphasizes the integration of theory with practical skills, as students will engage in laboratory experiments to validate circuit analysis techniques. Through these hands-on experiences, students will develop problem-solving abilities, critical thinking skills, and a deeper understanding of DC electrical circuits.			

Module 4

Code	Course/Module Title	ECTS	Semester
EDW1	Engineering Drawing	3.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
-	3	48	1
Description			
Engineering drawing is a general requirement for all engineering disciplines, as it is the means used to translate ideas from the world of perception and imagination to the world of tangible reality and to extract shapes and various components from reality to paper, which is the language of engineers, and aims to provide the student with the basic skills of engineering drawing and enable the student to read and understand engineering drawings Two- and three-dimensional drawing, isometric shapes, and projections. The ability to express ideas in an appropriate way of drawing and the ability to use some techniques in drawing. An engineering drawing is a subcategory of technical drawings that show the shape, structure, dimensions, tolerances, accuracy and other requirements needed to manufacture a product or part. An engineering drawing helps to define the requirements of an engineering part and conveys the design concept. The drawings can include an item or system's geometry, dimensions, tolerances, functions, finish, hardware and material.			

Module 5

Code	Course/Module Title	ECTS	Semester
ENG1	English Language I	4.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	4
Description			
In this course, the students will embark on a linguistic adventure, starting with a general introduction to the fundamentals of English grammar. Topics such as verb Be, possessive adjectives, and the usage of the possessive 's will be covered. Students then will delve into the practical aspects of language, including the present simple tense, forming questions and negatives, they will learn how to express habits, routines, and frequency using adverbs of frequency. Another essential aspect of communication is describing places, so they will explore how to use "there is/are" and demonstratives. Next, they will focus on personal abilities and possibilities using "can-can't," adverbs, and the past tense forms "was-were-could." Furthermore, students will be able to master the past simple tense, including regular and irregular verbs, and using appropriate time expressions. Additionally, they will explore prepositions ("in," "at," "on") and discuss plans and intentions using the *going to* future. Throughout the course, there will be ample opportunities for listening and speaking practice to improve the students' oral skills. they will also focus on reading and writing, with an emphasis on tense usage, enabling them to communicate effectively in different contexts.			

Module 6

Code	Course/Module Title	ECTS	Semester
EPH1	Electronics Physics	5.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	5
Description			
The course "Electronic Physics" offers students a comprehensive understanding of the fundamental principles and concepts underlying electronic devices and circuits. Through this course, students will delve into the physics of semiconductors, diodes, transistors, and other electronic components, and explore their diverse applications across various engineering domains. By combining theoretical knowledge with practical applications, students will develop the skills necessary to analyze, design, and troubleshoot electronic circuits. Moreover, this course serves as a crucial foundation for future studies in fields such as electrical engineering, electronics, and related disciplines. Through engaging lectures and hands-on activities, students will gain a deep understanding of electronic physics and its practical implications.			

Module 7

Code	Course/Module Title	ECTS	Semester
MAT2	Mathematics II	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	6
Description			
This part is considered anchored and complementary to the subject of calculus that the student studied in the first course, relying entirely on theories, facts, and methods of integration that the student studied. It is also assumed that the student is familiar with it well before studying this course, as this part is considered a basis for advanced courses in the link between the initial courses And advanced courses. The difficulty that the student faces in absorbing this course has been taken into account, as it includes the largest possible number of solved examples and applied aspects. The units of this course have been mentioned above under the subject of course objectives and learning and teaching strategy.			

Module 8

Code	Course/Module Title	ECTS	Semester
DSD2	Digital Systems Design II	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			

This course introduces the design synchronous sequential circuits using state diagrams, simplify design circuits, and implement the design using schematic entry. Also, it is covering the practical knowledge of digital logic system and ability to analyze and design sequential logic circuits used to construct digital systems. Topics of flip-flops, timing and state diagrams, analysis and design of sequential circuits, and memory devices. Students design digital system, such as a video driver or communications module is discussed in this course. At the end of this course, students should be able to understand and describe the behavior of Flip-Flops, Latches, shift registers and Counters also define the operation of memories. In addition, describe the configuration of programmable logic devices to implement sequential circuits. discuss the fundamental concepts of digital computer and digital design.

Module 9

Code	Course/Module Title	ECTS	Semester
ECT2	Electrical Circuits II	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
The AC Electrical Circuits course provides understanding of alternating current (AC) circuits and their analysis techniques. Students will explore the fundamental concepts and principles underlying AC circuits, starting with an introduction to sinusoidal alternating waveforms. They will learn how to calculate average and RMS values and gain insight into different combinations of AC circuits. The course covers key components such as inductors, capacitors, and resistors, examining their behavior in series and parallel circuits. Students will gain knowledge in analyzing the effects of inductors and capacitors in various circuit configurations. Students will learn how to calculate and interpret these power quantities, including active power, reactive power, apparent power, and power factor highlighting their significance in practical applications. Students will investigate the phenomenon of resonance in series AC circuits and its practical implications. Throughout the course, laboratory experiments will provide hands-on experience, allowing students to apply theoretical concepts and develop practical skills. By the end of the course, students will be equipped with the knowledge and skills necessary to analyze and design AC electrical circuits, preparing them for further studies or careers in electrical engineering and related fields.			

Module 10

Code	Course/Module Title	ECTS	Semester
CPR2	Computer Programming I	5.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	3
Description			
This course aims to provide students with the basic skills of programming principles and methods, algorithms, and their applications through different programming languages. It includes an introduction to basic programming concepts with a high-level programming language. The course covers the basic structure of a program and basic concepts and expressions such as data, variables, constants, and input operations. Orientation, arithmetic, logical operations, control, selection structure, conditional			

statements, repetition clauses, functions, exchange of transactions between functions, and how to employ these components among themselves to build an optimally integrated program, in addition to matrices, and some of their applications.

Module 11

Code	Course/Module Title	ECTS	Semester
MTC2	Mathematic for Computing	4.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	3
Description			
Computational mathematics is an area of mathematics devoted to the interaction between mathematics and computer computation. A large part of computational mathematics consists roughly of using mathematics for allowing and improving computer computation in areas of science and engineering where mathematics are useful. This involves in particular algorithm design, computational complexity, numerical methods and computer algebra. Computational mathematics refers also to the use of computers for mathematics itself. This includes mathematical experimentation for establishing conjectures (particularly in number theory), the use of computers for proving theorems, and the design and use of proof assistants. Mathematics and Computing include the analysis and the in-depth study and understanding of abstract concepts, like numbers and patterns. It is designed to provide students with a theoretical background and practice training in computer science and mathematical finance of study. Mathematics is the study and application of languages for describing various universal modelling and beyond, whereas computing brings in solutions for the problems of mathematical approach efficiently. Mathematics and computing, therefore, go hand in hand and are connected in understanding both subjects related. Several universities provide the study of mathematics and computing with the rise in demand for the subject and the opportunities one receives in studying the subject.			

Module 12

Code	Course/Module Title	ECTS	Semester
HRD2	Human Rights and Democracy	3.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	2
Description			
تعد حقوق الانسان والديمقراطية من الموضوعات ذات الاولوية والاهمية على الصعيدين المحلي والدولي ،فقد عقدت بشأنها العديد من المؤتمرات والندوات، ووقعت لأجله عشرات المعاهدات ،كما شغل هذا الموضوع ذهن رجال الفكر والقانون والسياسة ،ومايزالون منشغلين به ،فقد انبرت اقلامهم في سبيل توضيحه او المطالبة به. ونظرا لاهميته لمختلف فئات المجتمع الانساني عامة،فقد اصبح اليوم من المقررات الدراسية الاساسية في المؤسسات التعليمية لكثير من بلدان العالم ومنها العراق،ولعل اللجوء الى تدريس مثل هكذا مواضيع والتعريف بمفاهيمها ومعرفة انواعها وخصائصها وتوضيح تاريخ تطورها والاطلاع على المواثيق والاعلانات والاتفاقيات الدولية المهمة المتعلقة بهذا الشأن ،ومن ثم محاولة تحليل مضمونها وتبيان حدودها وعرض موضعها القانوني، اصبح اليوم من الامور الملحة الملقاة على عاتق اغلب الكليات الانسانية والعلمية،وذلك من اجل تعميق وترسيخ فكرة حقوق الانسان في فكر ووجدان الطلبة، وتعميق الوعي لديهم بأن هذه المباديء هي عالمية،ولاتختصر بأقليم معين،جاء التأكيد عليها في الكثير من الوثائق والاتفاقيات			

، فضلا عن وجوب الدفاع عنها من المكاسب الحضارية للمجتمع الانساني. ومع ان المناهج الدراسية في العديد من الكليات لاتخلو من الاشارة الى الكثير من موضوعات حقوق الانسان ومفاهيم الديمقراطية والحريات العامة، الا ان المعنيين بشؤون التعليم أدركوا اهمية تخصيص مادة مستقلة بذاتها لتدريسها لطلبة الدراسات الاولية في المؤسسات التعليمية كافة، وذلك بعد التغيرات الجذرية التي حصلت بالعراق بعد عام ٢٠٠٣.

Module 13

Code	Course/Module Title	ECTS	Semester
EMT3	Engineering Mathematics I	6.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	6
Description			
This course introduces students to trigonometric series of Fourier, which is an expansion of a periodic function into a sum of trigonometric functions. Many problems involving the function become easier to analyze because trigonometric functions are well understood. This course also covers the common forms of the Fourier series (sine and cosine, exponential as well as amplitude phase forms. The Fourier transform, which is a transform that converts a function into a form that describes the frequencies present in the original function is also covered in this course. The integral transform that converts a function of a real variable in the time domain to a function of a complex variable in the complex frequency domain (also known as s-domain or s-plane). The many applications in science and engineering of this transform are also explained in this course. Hence a powerful tool for solving differential equations is gained.			

Module 14

Code	Course/Module Title	ECTS	Semester
ELC3	Electronics	6.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
This course focuses primarily on the study of diodes. This course provides students with a comprehensive understanding of diode principles and their applications in electronic circuits. Throughout the class, students delve into the fundamental concepts of diode operation. They learn various diode models and circuit analysis techniques, enabling them to analyze and design basic diode circuits such as rectifiers, clippers, and clampers. Additionally, students explore more advanced topics. The course aims to develop students' theoretical knowledge and practical skills in working with diodes. Through hands-on laboratory sessions, students gain practical experience in building and troubleshooting diode circuits. They also learn to apply critical thinking and problem-solving skills to evaluate diode-based circuits' performance and limitations. By the end of the course, students are equipped with the necessary knowledge and skills to analyze, design, and troubleshoot diode circuits, preparing them for further studies or careers in the field of communications engineering.			

Module 15

Code	Course/Module Title	ECTS	Semester
CPR3	Computer Programming II	5.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	3
Description			
This course provides students with advanced programming concepts and applications, including learning functions, mathematical equations, search and order algorithms, containers, structures, pointers, file manipulation, and file input and output operations. The course also includes an explanation of the most important principles of programming, namely the principle of concurrency, multithreading, and exception handling. At the end of the course, students will have the ability to build complete programs correctly with the optimal use of the capabilities and tools provided by the language, the ability to follow up the logical implementation of the program and to identify and correct logical and syntax errors.			

Module 16

Code	Course/Module Title	ECTS	Semester
EMF3	Electromagnetic Fields	4.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	4
Description			
This course presents a study of electromagnetic fields and their relationship to problem solving in engineering. The course of study begins with the development of an understanding of the basics, moves to integration of the basic knowledge, and proceeds to the ability to use that knowledge to solve electromagnetic field problems. This course present information to deal with different coordinate systems for solving electromagnetic fields problems. Topics covered include: vector analysis, Coulomb's law and electric field, Gauss' law and divergence, energy and potential, Poisson's and Laplace's equation, study magnetic field, magnetic flux, magnetic intensity and Maxwell's Equations.			

Module 17

Code	Course/Module Title	ECTS	Semester
MCP3	Mobile Computing	5.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
A mobile computing course covers the principles, technologies, and applications of mobile computing. It includes topics such as mobile hardware and software, mobile operating systems, mobile app			

development, mobile security, and mobile data management. Students will learn about the history and evolution of mobile computing, different types of mobile devices and operating systems, and how to develop mobile apps for different platforms. The course also covers mobile security threats and measures, as well as data management strategies for mobile devices. Overall, the course equips students with the skills and knowledge needed to develop secure and efficient mobile applications.

Module 18

Code	Course/Module Title	ECTS	Semester
STP3	Statistics and Probability	4.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	3
Description			
Students will learn the two types of inferential and descriptive statistics, location and variance measures of random experiment data, and some of the most important descriptive schemes for that data, then teach them group theory in preparation for introducing them to probability theory, calculating probabilities using the Venn diagram method, and arithmetic methods for probabilities. Then they learn random variables of both types, intermittent and continuous, some statistical distributions, calculating statistical measures and probabilities according to probability distributions. Then we conclude the course by teaching them the coefficient and regression or correlation of data.			

Module 19

Code	Course/Module Title	ECTS	Semester
EMT4	Engineering Mathematics II	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	6
Description			
This course introduces students to z-transform in mathematics and signal processing, the Z-transform converts a discrete-time signal, which is a sequence of real or complex numbers, into a complex frequency-domain (z-domain or z-plane) representation. Bilateral Z-transform, Unilateral Z-transform and Inverse Z-transform are introduced in this course. The rest of course covers the differential equations and study how they relate one or more unknown physical quantity and their rates of change. Such relations are common; therefore, differential equations play a prominent role in many disciplines including engineering, physics, economics, and biology. The study of differential equations consists mainly of the study of their solutions (the set of functions that satisfy each equation), and of the properties of their solutions.			

Module 20

Code	Course/Module Title	ECTS	Semester
DEL4	Digital Electronics	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
This course provides students with a comprehensive understanding of transistors and their circuits. This course explores the principles, operation, and applications of transistors in the digital domain. Students delve into the intricate workings of transistors, examining their characteristics, modes of operation, and the analysis of transistor-based circuits. Through a combination of theoretical knowledge and practical implementation, students learn to design and analyze various transistor circuits, including amplifiers, switches, logic gates, and oscillators. The course also covers topics such as digital logic families, operational amplifiers, and microcontroller interfacing. By the end of the course, students are equipped with the skills to comprehend and construct complex digital circuits utilizing transistors. They develop the ability to evaluate circuit performance, understand different logic families, and explore practical applications of digital electronics. This class serves as a foundation for students pursuing careers in communications engineering.			

Module 21

Code	Course/Module Title	ECTS	Semester
CMF4	Communication Fundamental	7.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	6
Description			
This course provides the students the essential knowledge related to understand the principles of communications systems and the function of each element. Its learn the types of signals which are deal by systems. It is providing the essential knowledge related to understand the Analog Modulation types, amplitude modulation (AM), angle modulation, generation and modulation, this course covers details of (FM& AM) transmitter and Receiver designs and how to calculate the important factors such as transmit power and operating bandwidth and represent the signals in time domain and frequency domain. The course learns the students how to build the Modulators and De-modulators for each applications in communication systems. Course offered the how to design the multiplexing and de-multiplexing for FDM, TDM, WDM. Moreover, provide essential knowledge related Noise and how to eliminate it.			

Module 22

Code	Course/Module Title	ECTS	Semester
MPS4	Microprocessors	5.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
This course introduces microprocessor architecture and microcomputer systems including memory and input/output interfacing. Topics include low-level language programming, bus architecture, I/O systems, memory systems, interrupts, and other related topics. The course deals with advanced concepts in the programming and the interfacing of microprocessors/microcontrollers to the outside world as demonstrated by a variety of application examples. It covers the advanced architecture of modern processors and the many I/O peripherals now commonly found on-board the device. Detailed studies of computer I/O and interrupt techniques as applied to analog-to-digital, digital-to-analog, timers, parallel and serial interfaces are included. Laboratory activities provide the student with experience in developing the hardware and software required to incorporate microprocessors into systems that solve real-world interfacing problems.			

Module 23

Code	Course/Module Title	ECTS	Semester
EET4	Engineering Ethics	3.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	2
Description			
Engineering Ethics is a course that explores the ethical principles and considerations specific to the field of engineering. It emphasizes the importance of ethical decision-making, professional responsibility, and the social impact of engineering. Through the study of real-world case studies and ethical frameworks, students develop the knowledge and skills necessary to identify and address ethical challenges in engineering practice. Topics covered include the analysis of professional codes of ethics, ethical dilemmas in engineering, social and environmental implications of engineering decisions, and the global context of engineering ethics. By the end of the course, students will have a comprehensive understanding of ethical responsibilities in engineering and the ability to navigate complex ethical issues in their profession.			

Module 24

Code	Course/Module Title	ECTS	Semester
ENG4	English Language II	3.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	2

Description
In this course, the students will begin by exploring various tenses and question forms. This foundation will pave the way for their language journey ahead. Next, they will dive into the present tenses, both progressive and simple, to express ongoing actions and general truths, respectively. they will then shift their focus to past tenses, including the simple and progressive forms, to have an idea on how to discuss past events and describe ongoing actions in the past. Expressing quantity using "much," "many," "some," and "any" Will be covered along with future forms, to discuss future plans and express intentions effectively. Then the students will delve into comparative and superlative forms. They will later focus on present perfect tense and discussing unfinished past events and definitive past actions, along with the past perfect and narrative tenses. Finally, hypothetical situations and future possibilities will be discussed by the usage of conditionals. Throughout the course, there will be ample opportunities for listening and speaking practice to improve their oral skills. they will also focus on reading and writing, with an emphasis on tense usage, enabling them to communicate effectively in different contexts.

Module 25

Code	Course/Module Title	ECTS	Semester
LAG5	Linear Algebra	5.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	5
Description			
Linear algebra courses have two basic parts. The first part is matrix arithmetic, a fairly simple, computational set of arithmetic rules. The second part of the course involves vector spaces. This will be most students' first exposure to axiomatic mathematics. In this section of the course, students will see material presented in the higher-level mathematical model of definition-theorem-proof. Students will usually find the vector space material more abstract and thus more difficult. The purpose of this course is to enable you to employ the concepts and techniques of linear mathematics and to provide a stepping stone to higher-level mathematics classes. S–2 MATH 2085 Linear Algebra Syllabus It is assumed you have completed a second-semester calculus course and are familiar with differentiation and integration of real valued functions of a single variable.			

Module 26

Code	Course/Module Title	ECTS	Semester
AWP5	Antennas and Wave Propagation	6.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	4
Description			
This course aims to provide students with capabilities to be able to design and implement antenna systems and to understand the effect of the frequency over the implemented and designed hardware. Moreover, choosing the matching hardware that is regarded optimum in term of power losses, reflected			

and transmitted is the core of this course, propagation waves over the space will be study in the course. This course provide the principles of design different types of antennas and array antenna. The direction of arrival techniques are explained based on its standard equations of different techniques. Finally, this course Prepares the student to work in the field of communications with high skill.

Module 27

Code	Course/Module Title	ECTS	Semester
CNT5	Computer Networks I	5.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
This module explores the principles, concepts, and technologies associated with computer networks. It provides students with a comprehensive understanding of how computer networks function, how they are designed, and how they can be effectively utilized in various applications. Students should be familiar with commonly used notions and protocols in computer networks and be able to design and implement a simple network. The module focus on the main steps inside any network system which include: The design phase, the routing phase, and the services phase. The used practical side of this module will be a good knowledge to students for simulating a real scenario problems with their solutions. After completing this module, students should have gained a thorough understanding of various aspects related to computer networks.			

Module 28

Code	Course/Module Title	ECTS	Semester
DCM5	Digital Communications	6.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
Digital communication becomes the core for almost all the fields in the new smart world. The course aims to makes the student aware of the essential parts of the digital communication system. First, presents the importance of the digital systems, then gives the features with full analysis and mathematical representation for each stage in the digital communication system block diagram. Students are able to understand the formatting or the analog to digital conversion in the well-known steps, sampling, quantizing and encoding. Then, presents the main two types of modulation in the two frequency regions. Starting with the base-band modulation, presents the PAM.PPM and PWM with full knowledge of modulator and demodulator as well as advantages and disadvantages. Secondly, the digital modulation techniques are presented into four main essential types, BASK, BFSK, BPSK and QAM. Finally, student are learned how to use multiplexing techniques, TDM,FDM,CDM,PDMand SDM to make efficient utilization for the system resources represented by bandwith and time of access.			

Module 29

Code	Course/Module Title	ECTS	Semester
SSC5	Space Science I	3.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	1
Description			
This course introduces the principles and applications of space science in the context of communication systems. Students will explore topics such as the laws of motion, gravitation, and celestial mechanics to understand the dynamics of space objects. They will examine satellite systems, including communication architectures and orbital mechanics, and learn how to analyze link budgets for effective communication. The course covers remote sensing and Earth observation from space, including data acquisition and processing techniques. Students will gain insights into space weather phenomena and their impact on communication systems, as well as mitigation strategies. Additionally, the principles and applications of global navigation satellite systems (GNSS), with a focus on GPS, will be explored. Assessment methods include quizzes, assignments, and a final examination. Prerequisites: Foundational courses in mathematics, physics, and basic engineering principles.			

Module 30

Code	Course/Module Title	ECTS	Semester
WDG5	Web Design	5.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	3
Description			
This course introduces students to basic web design using HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets). Throughout the course students are introduced to planning and designing effective web pages; implementing web pages by writing HTML and CSS code; enhancing web pages with the use of page layout techniques, text formatting, graphics, images, and multimedia; and producing a functional, multi-page website. Furthermore, the course introduced to deal with dynamic web pages; implementing web pages by writing JS code with involvement of practical sessions, assignments, and real-time projects which help the students in understanding the concepts better. The course covers the JS language fundamental. Students are trained in building actual web applications. This will help them in their future professions. The course also covers PHP & MySQL database, for developing interactive Web sites, build interactive, data-driven websites with the potent combination of open source technologies and web standards.			

Module 31

Code	Course/Module Title	ECTS	Semester
NUA6	Numerical Analysis	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	3
Description			
Numerical analysis is the study of algorithms that use numerical approximation for the problems of mathematical analysis (as distinguished from discrete mathematics). It is the study of numerical methods that attempt at finding approximate solutions of problems rather than the exact ones. Numerical analysis finds application in all fields of engineering. Current growth in computing power has enabled the use of more complex numerical analysis, providing detailed and realistic mathematical models in science and engineering. Numerical analysis is a branch of mathematics that solves continuous problems using numeric approximation. It involves designing methods that give approximate but accurate numeric solutions, which is useful in cases where the exact solution is impossible or prohibitively expensive to calculate. Numerical analysis also involves characterizing the convergence, accuracy, stability, and computational complexity of these methods. Matalab is widely used for applied numerical analysis in engineering. It provides a range of numerical methods for: Interpolation, extrapolation, and regression, Differentiation and integration, linear systems of equations, Eigenvalues and singular values, Ordinary differential equations (ODEs), Partial differential equations (PDEs). Perform fast Fourier transforms, quadrature, optimization, and linear programming with the MATLAB. Create and implement new numerical methods using the built-in support for vector and matrix operations in the MATLAB language. Series expansions: from calculus to computation. Integrals as sums and derivatives as differences. Interpolation, splines, and a second look at numerical calculus. Numerical methods for ODE, initial-value problems. Root finding, Newton's method, and boundary-value problems.			

Module 32

Code	Course/Module Title	ECTS	Semester
DSP6	Digital Signal Processing	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
The course covers theory and methods for digital signal processing including basic principles governing the analysis and design of discrete-time systems as signal processing devices. Review of discrete-time linear, time-invariant systems, Fourier transforms and z-transforms. Topics include sampling, impulse response, frequency response, finite and infinite impulse response systems, linear phase systems, digital filter design and implementation, discrete-time Fourier transforms, discrete Fourier transform, and the fast Fourier transform algorithms. also covers how to manipulate data via digital filters and how to convert analog signals into digital. The solid theoretical bases are complemented by applied examples in Matlab. Design and lab exercises are also significant components of the course.			

Module 33

Code	Course/Module Title	ECTS	Semester
CNT6	Computer Networks II	6.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	5
Description			
This module explores the concepts for computer network protocols. It provides students with a comprehensive understanding of how computer networks protocols function, how they are designed, and how they can be effectively utilized in various applications. Students should be able to understand Common Network Protocols including RIP, OSPF, HTTP, DNS, FTP, and others. They should understand the purpose, and functionality of these protocols. Also the students will take a brief look on network security issues. By mastering these concepts, students completing a network protocols module will have a deep understanding of the principles, functionality, and operation of network protocols. They will be equipped to analyze, evaluate, design, and troubleshoot protocols, ensuring efficient and reliable communication in computer networks, also the functionality of the WWW will be cleared.			

Module 34

Code	Course/Module Title	ECTS	Semester
ITC6	Information Theory and Coding	6.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	5
Description			
In this course the student will be able to define the concept of the entropy and its relation to the information. To transmit the data from the transmitter to the receiver via the channel, this course presents the philosophy of data transmission and the modelling of each side of the system as a random variable. So, to make this model of data transmission, the course presents the derivation for different types of entropy the discrete shape (marginal, joint and conditional) and the continuous shape as the differential entropy, us and the concept of mutual information, the student will be able to derive the mathematical model for AWGN,BSC and BEC channel capacity. Then the student will learn how to use channel error correction to achieve this channel capacity by using FEC codes. Coding theory is presented in basic information to encode and decode linear block codes and cyclic codes for single error correction.			

Module 35

Code	Course/Module Title	ECTS	Semester
SSC6	Space Science II	3.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	-	48	1

Description
Space Science II is an advanced course in the 5th semester of the Communications Engineering program. Building on the foundations of Space Science I, this course explores advanced topics in space science and their applications in communication systems. Topics include advanced satellite communication systems, satellite link analysis, space mission design, space-based navigation, space debris management, and emerging technologies in space science. Students will develop skills in optimizing communication performance, mission planning, navigation techniques, and ensuring space sustainability. Assessment methods include assignments, projects, and a final exam. Prerequisites: Completion of Space Science I or equivalent introductory course.

Module 36

Code	Course/Module Title	ECTS	Semester
WCN6	Wireless Communication Networks	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
This course will cover the latest research in the area of Wireless Sensor Networks. We will cover all aspects of these unique and important systems, from the hardware and radio architecture through protocols and software to applications. Topics will include sensor network architectures, hardware platforms, physical layer techniques, medium access control, routing, topology control, quality of service (QoS) management, localization, time synchronization, security, storage, and other advanced topics. Each student must complete a semester-long course project related to wireless sensor networks. The computation of energy consumption of sensor node is presented and analyzed. Finally, the design of wireless sensor network for different application is presented. At the final of this course the student can be work with different types of sensor nodes for design and implement the wireless sensor network for different applications.			

Module 37

Code	Course/Module Title	ECTS	Semester
EDS7	Embedded Systems	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	3
Description			
This subject explores the design, development, and integration of embedded systems, which are specialized systems designed for specific tasks and integrated within larger devices or systems. The course provides a comprehensive understanding of the principles, architectures, and technologies underlying embedded systems. Students will learn about hardware and software aspects, including microcontrollers, sensors, actuators, and communication protocols. Emphasis is placed on the design process, system modeling, programming, and debugging techniques for embedded systems. Practical			

projects and hands-on exercises allow students to apply their knowledge to solve real-world problems and gain experience in system integration and optimization. By the end of the subject, students will have acquired the skills necessary to develop and deploy embedded systems in various domains, such as automotive, consumer electronics, and industrial automation.

Module 38

Code	Course/Module Title	ECTS	Semester
MAP7	Mobile Applications	6.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4
Description			
This course provides students with a comprehensive understanding of the basics of mobile applications. The course presents fundamental notions and techniques used in mobile application programming. It starts with universal basics and gradually extends to advanced issues observed in mobile application development. Students will gain knowledge about the evolution of modern mobile operating platforms and their operating systems, as well as programming languages used to create mobile applications. Upon completing the requirements for this course, students will be able to: create a mobile application using the Swift programming language, debug a mobile application written in the Swift programming language, and test a mobile application written in the Swift programming language.			

Module 39

Code	Course/Module Title	ECTS	Semester
MCM7	Mobile Communications I	6.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	5
Description			
Communication is one of the integral parts of science that focus for exchanging information among parties at locations physically apart. After its discovery, telephones have replaced the telegrams and letters. Similarly, the term ‘mobile’ has completely revolutionized the communication by opening up innovative applications that are limited to one’s imagination. Today, mobile communication has become the backbone of society. When a user makes a call request by using channel allocation strategies their requests are fulfilled. Channel Allocation Strategies are designed in such a way that there is efficient use of frequencies, time slots and bandwidth. These are Fixed, Dynamic, and Hybrid Channel Allocation. Mobile phone is primarily designed for Voice communication. While new generation mobile phones support many additional services, and accessories, such as SMS, email, packet switching for access to the Internet, gaming, Bluetooth, camera and MMS for sending and receiving photos and video, MP3 player, radio and GPS.			

Module 40

Code	Course/Module Title	ECTS	Semester
NTS7	Network security	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
Networks are the foundation for most business operations today. As more and more computers become connected to larger public networks to power information availability, learning how to keep the data, network, and servers safe in today's organizations has now become more important than ever. This course will help you understand the challenges and solutions for designing secure networks. First, you will gain an understanding of the core network security concepts, applying security design principles for securing network systems. Next, you will explore network monitoring techniques to identify potential hackers targeting your network. Using tools like TCPDUMP and Wireshark. Then, you will fully understand how to best use firewalls, IDS and IPS in your network to secure it against threats and attacks. Finally, you will learn about wireless encryption weaknesses and social engineering techniques attackers' use to compromise systems, and the tools you can use to fight back.			

Module 41

Code	Course/Module Title	ECTS	Semester
PMG7	Project Management	4.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	2
Description			
Project management is the systematic approach of planning, organizing, and controlling resources to achieve specific goals within defined constraints. It involves the careful coordination of tasks, timelines, budgets, and team members to successfully complete projects. The project manager plays a pivotal role in overseeing the entire project lifecycle, from initiation to closure. They ensure that project objectives are clearly defined, stakeholders are engaged, risks are identified and mitigated, and progress is monitored. Effective project management involves communication, collaboration, problem-solving, and adaptability. By utilizing proven methodologies, tools, and techniques, project management enhances efficiency, minimizes risks, and maximizes the likelihood of project success.			

Module 42

Code	Course/Module Title	ECTS	Semester
GPR7	Graduation Project I	4.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	2
Description			

Module 43

Code	Course/Module Title	ECTS	Semester
OFC8	Optical Fiber Communications	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
A fiber optics communication course covers the principles, technologies, and applications of fiber optic communication systems. It includes topics such as optical fibers, light sources, detectors, optical amplifiers, and signal processing. Students will learn about the physics of light propagation in optical fibers, different types of optical fibers and their properties, and how to design and implement fiber optic communication systems. The course also covers fiber optic network architectures, transmission techniques, and performance analysis. Overall, the course equips students with the skills and knowledge needed to design and implement high-speed and reliable fiber optic communication systems.			

Module 44

Code	Course/Module Title	ECTS	Semester
IOT8	Internet of Things	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
The subject "Internet of Things" explores the interconnected network of physical devices, vehicles, buildings, and other objects embedded with sensors, software, and connectivity, enabling them to collect and exchange data. This interdisciplinary field encompasses the integration of various technologies, such as embedded systems, sensors, actuators, cloud computing, and artificial intelligence, to create a seamless environment where everyday objects can communicate and interact with each other and with humans. This subject delves into the fundamental concepts, architectures, and applications of the Internet of Things (IoT). Students will gain an understanding of the underlying technologies, protocols, and standards that enable IoT systems, as well as the challenges related to security, privacy, and scalability. They will explore the transformative potential of IoT across various sectors, including healthcare, transportation, smart cities, agriculture, and manufacturing. Through hands-on projects and case studies, students will develop the necessary skills to design, implement, and manage IoT solutions, contributing to the advancement of this rapidly evolving field.			

Module 45

Code	Course/Module Title	ECTS	Semester
MAD8	Mobile Applications Development	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
This course offers the fundamentals for understanding the principles of mobile application design and development. The Android platform will be used as a basis for teaching programming techniques and design patterns related to the development of standalone applications and mobile portals. Topics covered will include memory management, user interface design, user interface building, input methods, data handling, network techniques, URL loading, and specific features such as GPS and motion sensing. The emphasis of this course is placed on the processes, tools, and frameworks required to develop applications for current and emerging mobile computing devices. Students will work at all stages of the software development life cycle, from inception to implementation and testing.			

Module 46

Code	Course/Module Title	ECTS	Semester
MCM8	Mobile Communications II	6.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	5
Description			
Early mobile telephone systems used base stations with large power amplifiers and tall towers to cover large geographic areas. The more successful 1G systems were Advanced Mobile Phone Service. 2G digital systems provided significant increase in voice capacity, improved voice quality, and began support for data applications such as Internet access. 3G systems providing much higher data rates, significant increase in voice capacity, and supporting advanced services and applications, including multimedia. 4G LTE uses a different form of radio interface, using OFDMA / SC-FDMA instead of CDMA, there are many similarities with the earlier forms of 3G architecture and there is scope for much re-use. The main new functionalities introduced in LTE-Advanced are Carrier Aggregation, enhanced use of multi-antenna techniques and support for Relay Nodes (RN). 5G expands mid-band spectrum range accessible to cellular networks and add new high-band spectrum. 5G mmWave networks require the use of “small cells”. It designed to add additional capacity over small coverage areas.			

Module 47

Code	Course/Module Title	ECTS	Semester
CCP8	Cloud Computing	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	4
Description			
Cloud computing is the on-demand availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user. Large clouds often have functions distributed over multiple locations, each of which is a data center. Computer network administrators, or network specialists, design, install, and support an organization's local area network (LAN), wide area network (WAN), network segment, or Internet system. They maintain network hardware and software, analyze problems, and monitor the network to ensure availability to system users. Administrators also might plan, coordinate, and implement network security.			

Module 48

Code	Course/Module Title	ECTS	Semester
GPR8	Graduation Project II	4.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	2
Description			

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