وزارة التعليم العالي والبحث
جهاز الاشراف والتقويم العلمي
دائرة ضمان الجودة والاعتماد الأكاديمي

استمارة وصف البرنامج الأكاديمي للكليات والمعاهد

الجامعة: تكريت
المعهد /الكلية: هندسة الشرقاط
تاريخ ملئ الملف: 2024/9/10

التوقيع
اسم المعاون العلمي
م.د. علاء يوسف علي
التاريخ:2024/9/10

م.د.
علاء يوسف علي
معاون العميد للشؤون العلمية

التوقيع
دققت من قبل مدير شعبة ضمان الجودة والاداء الجامعي
م.م. عبدالله عيسى صبح
التاريخ: 2024/9/10

مصادقة السيد العميد

أ.د. خميس خلف حسن

٢٠٢٤/٩/١٠

أ.د.
خميس خلف حسن
رئيس قسم عميد كلية هندسة الشرقاط

Tikrit University

جامعة تكريت

First Cycle – Bachelor's Degree (B.Sc.) - Electrical Engineering

بكالوريوس - هندسة كهربائية

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Electrical Engineering to gain the Bachelor of Science degree. The program delivers (44) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٤) مادة دراسية، مع (٦٠٠٠) 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
TUSHEE1100	Mathematics I	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	123	77
Description			
This course provides an introduction to the basic concepts and techniques of calculus and linear algebra, emphasizing their inter-relationships and applications to engineering, the sciences, and develops problem solving skills with both theoretical and practical problems. Topics covered are - Calculus: Functions of one variable, differentiation, and its applications, the definite integral, techniques of integration. Algebra: Systems of linear equations, subspaces, matrices, optimization, determinants, applications of linear algebra. The course is aimed at developing the basic Mathematical skills for Engineering students that are imperative for effective understanding of Engineering subjects. The topics introduced will serve as basic tools for specialized studies in many Engineering fields.			

Module 2

Code	Course/Module Title	ECTS	Semester
TUSHEE1101	Engineering Drawings	6	1
Class (hr/w)	**Lect/Lab./Prac. /Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	6	123	27
Description			
An engineering drawing course focuses on usage of drawing instruments, lettering, construction of geometric shapes, etc. Students study the use of dimensioning, shapes and angles or views of such drawings. Dimensions feature prominently, with focus on interpretation, importance and accurate reflection of dimensions in engineering drawing. Other areas of study in this course may include projected views and development of surfaces. The course will define and explain the uses of different drawing equipment and identify the different drawing equipment and Layout drawing papers and prepare a title block. Practically distinguish the types of dimensioning with Carry out geometrical construction of different shapes along with carry out isometric and orthographic drawing of objects.			

Module 3

Code	Course/Module Title	ECTS	Semester
TUSHEE1102	Computer Skills	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
Computer Proficiency is an inevitable part of electrical engineering as well as other education sectors. The course is aiming to equip all the commerce aspirants to have basic skills as well as hands on experience on word processing, for creating excel spreadsheets, for building databases and preparing presentations, through the use of Microsoft Office Word, Excel, and PowerPoint programs, MS Windows, Internet and E-mail.			

Module 4

Code	Course/Module Title	ECTS	Semester
TUSHEE1103	Physical Electronic	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		63	87
Description			
This course aims to teach the fundamentals of discrete semiconductor devices and their applications, the chemical, electronic, and physical properties of semiconductors are examined. Basic operating principles and modulus of semiconductor devices including the p-n junction, p-n junction bias, the barrier potential. The physical basis of electronic devices and their applications in analog systems. Diodes and their properties are explored. Basic models for diodes including light-Emitting diode, photodiode, tunnel diode, schottky diode, laser diode, solar cell diode and zener diode. The use of semiconductors devises in digitals circuits, and optoelectronics applications are analyzed.			

Module 5

Code	Course/Module Title	ECTS	Semester
TUSHEE1104	Arabic Language	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
يوفر المقرر معلومات عامة عن قواعد اللغة العربية وكيفية صياغة الجمل ويطور تطوير مهارات الطلبة على التحدث باللغة العربية من ناحية صياغة الجمل واللفظ والكتابة الصحيحة باقل الاخطاء.			

Module 6

Code	Course/Module Title	ECTS	Semester
TUSHEE1105	English Language I	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
This course is designed to give the students the opportunity to practice different language skills like reading, listening, speaking, and writing.			

Module 7

Code	Course/Module Title	ECTS	Semester
TUSHEE1200	Fundamentals of Electrical Engineering	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
6	4	153	47
Description			
An introductory course to the fundamentals and basic principles of DC and AC circuits. Topics include resistance, voltage, current, Ohm's Law, Kirchhoff's Laws, power, superposition, network theorems, Thevenin's and Norton's Theorems, maximum power transfer, introduction to AC, capacitors and inductors. Laboratory hours complement class work.			

Module 8

Code	Course/Module Title	ECTS	Semester
TUSHEE1201	Digital Techniques	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	77
Description			
This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding of basic digital techniques to perform simple analysis and assessment of system performance. This course provides basic concepts reinforced by plentiful illustrations, examples, exercises, and applications. The approach used in this course allows students to master the all-important fundamental concepts before getting into more advanced topics digital techniques.			

Module 9

Code	Course/Module Title	ECTS	Semester
TUSHEE1202	Engineering Mechanics	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		63	87
Description			
Mechanics is the study of forces that act on bodies and the resultant motion that those bodies experience. With roots in physics and mathematics, Engineering Mechanics is the basis of all the mechanical sciences: civil engineering, materials science and engineering, mechanical engineering and aeronautical and aerospace engineering. Engineering Mechanics provides the “building blocks” of statics, dynamics, strength of materials, and fluid dynamics. Engineering mechanics is the discipline devoted to the solution of mechanics problems through the integrated application of mathematical, scientific, and engineering principles. Special emphasis is placed on the physical principles underlying modern engineering design.			

Module 10

Code	Course/Module Title	ECTS	Semester
TUSHEE1203	Engineering Workshop Skills	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
	4	63	37
Description			
The engineering workshop course focuses on identifying risks in the work environment and industrial safety guidelines. And training on how to measure and determine, and the use of filing tools and their work. Learn about the types of wood used in carpentry, the process of shaping it, and the use of carpentry tools and machines. Training in welding work, its types, and the process of joining metals by welding. Training on various casting works and training on mechanical operation, which includes turning, milling, and grinding. Training on pipe knowledge, how to connect, sanitary engineering works, and training on the basics of electrical workshops.			

Module 11

Code	Course/Module Title	ECTS	Semester
TUSHEE1205	MATLAB Programming	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
The course provides a gentle introduction to the MATLAB computing environment and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of interactive lectures and sample MATLAB problems given as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include basic use, graphical representations, and tips for designing and implementing MATLAB code.			

Module 12

Code	Course/Module Title	ECTS	Semester
TUSHEE2100	Electrical Networks	8	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	93	107
Description			
The aim of this course is graduate technical intermediate cadres with the ability to deal with electrical network systems and areas of their applications. This module will improve a basic understanding of the components of electrical circuits and how to deal with them in terms of studying important topics such as response circuits,3-phase,2-port systems, and filters. as well as develop the base of technical education of the department's outputs which benefits the community depending on a spirit of competition and cooperation in the field of electric network systems.			

Module 13

Code	Course/Module Title	ECTS	Semester
TUSHEE2101	Electronic I	8	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	138	62
Description			
This course provides an introduction to the fundamental concepts and analyses of electronic devices and circuits. Throughout the semester we will cover the modes of operation and biasing for the Bipolar junction transistors., the Construction, principal of Operation and Volt –Ampere characteristics for Field-Effect Transistors, multistage amplifiers distortion in amplifiers, Analysis of cascaded RC coupled BJT amplifier, cascade amplifier, Darlington pair, at the last the four layers device will be covered. On successful completion of the course students will be able to design, analyse and resolve electronic circuits and devices.			

Module 14

Code	Course/Module Title	ECTS	Semester
TUSHEE2102	Electrical Machines I (DC)	8	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	5	138	62
Description			
This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding of principle operation of dc electrical machines techniques, to perform simple analysis and assessment of system performance. From a system engineering perspective, we will find that the developments and advances of electrical machines technologies are closely related to those of electrical engineering. For students who undertake studies in fields other than electrical and electrical machines, this course will provide an in-depth overview of the fundamentals as well as modern techniques and systems in the d.c. machines field. A laboratory element provides students with hands-on and practical understanding in this field and expands the understanding of its applicability to real-world problems.			

Module 15

Code	Course/Module Title	ECTS	Semester
TUSHEE2103	Engineering Statistics	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
This course is designed to provide a solid foundation in statistics and data analysis. Students will learn key concepts and techniques necessary for understanding and interpreting data. The course covers various topics, including the nature of data, statistical symbols, measures of central tendency, dispersion, and probability theory. Students will also learn how to determine table width, construct frequency distribution tables, and calculate relative frequencies. They will explore measures of central tendency such as the arithmetic mean, engineering center, harmonic mean, quadratic mean, mediator, and the vein or the top. Additionally, the course delves into instinct, torsion measures, and flow meters, providing students with a comprehensive understanding of these concepts. Probability theory and its application in analyzing uncertainties and making informed decisions are emphasized, along with harmonic analysis techniques for studying periodic phenomena. The course concludes by introducing fundamental business concepts and their connection to probability and data analysis.			

Module 16

Code	Course/Module Title	ECTS	Semester
TUSHEE2104	Human Rights	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
يوصف هذا المقرر حقوق الانسان والتحسيس بأهميتها ، وكيفية الدفاع عن الحقوق واالمطالبها بها. كذلك يهتم هذا المقرر بتدريس مادة حقوق االنسان والتعريف باهم خصائص حقوق الانسان من المنظور المحلي والدولي والعرف االأجتماعي .			

Module 17

Code	Course/Module Title	ECTS	Semester
TUSHEE2200	Mathematics II	9	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
6	2	123	102
Description			
This course aims to Introduce students to the importance of mathematics and Introduce the student to the basic principles of advanced calculus, which are included in all fields Mathematics and its applications are included in the applications of engineering and all science departments. Students acquire the skills that enable them to teach mathematics.			

Module 18

Code	Course/Module Title	ECTS	Semester
TUSHEE2201	Computer Programming	9	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	102
Description			
This course introduces the C++ programming language, with a focus on its application in software development. Students will learn the fundamentals of C++ syntax, data types and control structures. In the second part of the course, students are introduced to practical application of the C++ programming language in engineering disciplines. It covers fundamental programming concepts and specific topics relevant to engineering, such as numerical computing, data analysis, and simulation. Through hands-on projects and assignments, students will develop the necessary skills to use C++ effectively for engineering tasks and gain an understanding of how to apply programming techniques to solve engineering problems			

Module 19

Code	Course/Module Title	ECTS	Semester
TUSHEE2202	Electromagnetic Fields	8	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	93	107
Description			
This course is a comprehensive undergraduate course on electromagnetic fields and waves. Topics covered include Maxwell's equations, electrostatics and magnetostatics, fields of charge distributions, fields near conductors, method of images, material polarization and dielectrics, fields of current distributions, electric and magnetic dipoles, power and energy in electromagnetism, electromagnetic work, electrodynamics, electromagnetic waves, wave polarization, wave propagation in isotropic and anisotropic media, wave propagation in plasmas, reflection, transmission, and refraction of waves at media interfaces, wave propagation in periodic structures and photonic bandgaps, guided waves in transmission lines, microwave circuits and smith charts, transients in transmission lines, metallic waveguides, dielectric waveguides, radiation and antennas, wire antennas, antenna arrays, diffraction, aperture antennas.			

Module 20

Code	Course/Module Title	ECTS	Semester
TUSHEE2203	English Language II	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
The teaching of course is delivered through a combination of lectures, online lectures, tutorials, and exercises.			

Module 21

Code	Course/Module Title	ECTS	Semester
TUSHEE2204	Democracy	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
يوفر المقرر معلومات عامة عن تطوير وفهم مبادئ الديموقراطية وتطبيقها في الجانب التعليمي لما له اهمية بالنهوض بتقدم البلد.			

Module 22

Code	Course/Module Title	ECTS	Semester
TUSHEE3100	Electrical Power System	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	78	72
Description			
This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding the principles of power system techniques, to perform simple analysis and assessment of system performance. From a system engineering perspective, we will find that the developments and advances of electrical power technologies are closely related to those of electrical engineering and computer engineering. For students who undertake studies in fields other than electrical and power generation,, this course will provide an in-depth overview of the fundamentals as well as modern techniques and systems in the electrical power generation and distribution fields.			

Module 23

Code	Course/Module Title	ECTS	Semester
TUSHEE3101	Engineering and Numerical Analysis	8	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
6	1	108	42
Description			
Mathematical analysis with emphasis on solution techniques and engineering applications. Topics include ordinary differential equations (ODEs), Laplace transformations, initial and boundary value problems, Fourier series and partial differential equations. Numerical differentiation, numerical integration.			

Module 24

Code	Course/Module Title	ECTS	Semester
TUSHEE3102	Communication Systems	8	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	77
Description			
This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding of basic analogue and digital communication techniques, to perform simple analysis and assessment of system performance. From a system engineering perspective, we will find that the developments and advances of telecommunication technologies are closely related to those of electrical engineering and computer engineering. For students who undertake studies in fields other than electrical and telecommunications, this course will provide an in-depth overview of the fundamentals as well as modern techniques and systems in the telecommunication field.			

Module 25

Code	Course/Module Title	ECTS	Semester
TUSHEE3103	Transmission Lines and Antenna	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	37
Description			
This course focuses on transmission lines. Students will study key concepts such as equivalent circuit, characteristic impedance, phase velocity, reflection coefficient, standing wave, Smith chart calculation, quarter-wave transformer, and stub matching. By the end of the course, students will have a solid understanding of transmission lines and their importance in electronic communication systems. Students will explore various topics, including antenna introduction, Hertz dipole, radiation patterns, power density, near field-far field, polarization, pattern width, dipole types, phased array, helical, parabolic, and loop antennas. Practical applications and design considerations will be emphasized. By the end of the course, students will have a solid understanding of antennas and the ability to design effective antenna systems for wireless communication.			

Module 26

Code	Course/Module Title	ECTS	Semester
TUSHEE3104	English III	2	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	33	17
Description			
This course is designed to give the students the opportunity to practice different language skills like reading, listening, speaking, and writing and language skills.			

Module 27

Code	Course/Module Title	ECTS	Semester
TUSHEE3105	Optoelectronics	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3		48	52
Description			
This course provides a complete overview of the wide variety of different semiconductor optoelectronic devices employed in light wave systems and networks. Topics include a variety of different subjects Including a detailed discussion of the design and operation of optical LEDs, the basic physics and operation of lasers and photo detectors, details of the basic physics and operation of solar cells. Emphasis is on the underlying device physics behind the operation and design of optoelectronic devices.			

*This is an elective course.

Module 28

Code	Course/Module Title	ECTS	Semester
TUSHEE3106	Mobile Communications	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3		48	52
Description			
Introduction, Basic Concepts, Historical Development, Wireless Communication Systems and Standards, Channel Models, Path Loss, Shadowing, Fading, Channel Classifications, Multiple Access Techniques, FDMA, TDMA, CDMA, Cellular Structures, Network Structure, Channel Assignment, Handover, Sectoring, Power Control, Diversity Techniques, MIMO Systems, Multicarrier Modulation, OFDM, OFDMA, All-IP Telecommunication Networks, 2nd, 3rd, 4th, 5th Generation and Beyond Wireless Communication Systems.			

*This is an elective course.

Module 29

Code	Course/Module Title	ECTS	Semester
TUSHEE3200	Electrical Machines II (AC)	8	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	77
Description			
The A.C. Machines module provides you with a detailed understanding of how alternators, induction motor and synchronous motors work, from theoretical concepts through to the design of practical alternators and motors. This module will introduce the fundamentals of principle operation of A.C. machines. Specifically, the module elaborates on fundamentals of three phase induction motor, single phase induction motor, synchronous generators and synchronous motor and begins to introduce detail characteristics, performance of each machine and, towards the end of the module highlighting the reasons A.C. machines importance. Students are introduced to current standard induction machines as well as the benefits synchronous generator can provide. A laboratory element provides students with hands-on and practical understanding in this field and expands the understanding of its applicability to real-world problems.			

Module 30

Code	Course/Module Title	ECTS	Semester
TUSHEE3201	Electronic II	8	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	77
Description			
This course also aims to establish fundamental knowledge of active filter, Filter concepts, types. Filter approximations, active RC filter design. Ladder design, Oscillator concepts, types. RC and LC oscillator, crystal oscillator. Power amplifiers types. Class A, class B, class AB and push-pull amplifiers. current mirror, current repeater. Wilder current sources. Bipolar technology RTL, DTL, TTL, IC fabrication process, IC components (transistor, capacitor), phase looked loop PLL.			

Module 31

Code	Course/Module Title	ECTS	Semester
TUSHEE3202	Microprocessor Engineering	8	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	77
Description			
This course provides a foundation in microprocessors and computer systems. Students will gain an understanding of the main structural components of a computer system, the evolution of Intel microprocessors, and the internal architecture and registers of the 8086 microprocessors. They will learn about physical address generation, addressing modes, and the distinction between unsigned and signed integer numbers. The course also covers the instruction set of the 8086 microprocessors, including data transfer, arithmetic and logic operations, program flow control, stack management, string manipulation, and input/output operations. Students will explore assembly language, converting instructions to machine code, and understanding interface signals. Additionally, they will study system clock and bus cycles, memory units such as RAM and ROM, and effective memory interfacing techniques. By the end of the course, students will have the necessary knowledge and skills to work with microprocessors and computer systems confidently.			

Module 32

Code	Course/Module Title	ECTS	Semester
TUSHEE3203	Electrical Measurements	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	37
Description			
This course covers a wide range of topics related to measurement and instrumentation. Students will begin with an introduction to measurement principles, including the system of units, measuring errors, and the analysis and classification of errors. The fundamentals of DC measurements will be explored, with a focus on DC instruments such as current, voltage, and resistor instruments, as well as series and parallel ohmmeters. AC measurement techniques will be covered, including AC instruments, half-wave and full-wave rectifier instruments, and the electrodynamic wattmeter. Bridge principles will be discussed, including DC and AC bridge circuits, their classification, and accessories. The course also includes in-depth studies on thermocouple instruments, transducers and sensors, and digital measurement techniques using instruments like digital multimeters and A/D converters. Through practical examples and hands-on experience, students will develop the necessary skills to perform accurate measurements in various fields.			

Module 33

Code	Course/Module Title	ECTS	Semester
TUSHEE3204	Radar Systems	2	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding of basic radar systems techniques, to perform simple analysis and assessment of system performance. From a system engineering perspective, we will find that the developments and advances of electricals technologies are closely related to those of electrical engineering and computer engineering. For students who undertake studies in fields other than electrical and telecommunications, this course will provide an in-depth overview of the fundamentals as well as modern techniques and systems in the telecommunication field.			

*This is an elective course.

Module 34

Code	Course/Module Title	ECTS	Semester
TUSHEE3205	Computer Networks	2	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
This comprehensive course on computer networks fundamentals provides an introduction to key concepts, protocols, and technologies. Students will gain a solid understanding of how data flows in a network using the OSI and TCP/IP models. They will explore the layers of these models, associated protocols, and learn to ensure efficient and reliable communication. Topics covered include the Physical Layer and Media, Data Link Layer, Wired LANs (Ethernet), Wireless LANs, connecting LANs, backbone networks, and Virtual LANs (VLANs), as well as the Network Layer addressing and Internet Protocol. Through practical exercises and theoretical knowledge, students will develop the skills necessary to design, configure, and troubleshoot computer networks, preparing them for careers in network administration, cybersecurity, and related fields.			

*This is an elective course.

Module 35

Code	Course/Module Title	ECTS	Semester
TUSHEE4100	Engineering Control	8	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	6	153	47
Description			
This course provides an introduction to the fundamental concepts and mathematics of control systems engineering. The topics cover classical control design methods as well as the modern control design techniques. A number of chosen problems are solved to illustrate the concepts clearly. A suite of exercises is also provided in the appendix after each module.			

Module 36

Code	Course/Module Title	ECTS	Semester
TUSHEE4101	Power Electronics	8	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	6	153	47
Description			
This course consists of lectures, tutorials, and practical sessions. Lectures will introduce new material and provide examples. During the tutorials, students will apply lecture theory to solve related problems. Practical session will be used to familiarize students with laboratory equipment and develop their practical skills			

Module 37

Code	Course/Module Title	ECTS	Semester
TUSHEE4102	Digital System Design	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		63	87
Description			
This course provides an understanding of various essential topics in the field of digital electronics and microprocessor systems. Students will explore the fundamental concepts and practical applications of timing circuits, including bistable, monostable, and astable multivibrators, as well as sequence generators. The course also focuses on the analysis and design of synchronous systems, covering finite state machines and algorithm state machines (ASM) with their real-world applications. In addition, students will delve into the hardware design aspects of microcomputers and microprocessors, specifically examining digital-to-analog converters (DAC) and analog-to-digital converters (ADC), their types, and applications. They will gain hands-on experience with digital devices such as memories (including mask ROM, EEPROM, and RAM), look-up tables (LUT), programmable logic devices (PLD), and field programmable gate arrays (FPGA). The course will also introduce students to the VHDL language for hardware design and simulation.			

Module 38

Code	Course/Module Title	ECTS	Semester
TUSHEE4103	Graduation Project I	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	33	67
Description			
Preparatory studies of the literature and data collection for the graduation project in a particular area of concentration and under the supervision of one of the academic staff members. The course covers directed readings in the literature of Electrical engineering, introduction to research methods, seminar discussions dealing with special engineering topics of current interest. Planning, design, construction and management of an engineering project. Writing a technical report.			

Module 39

Code	Course/Module Title	ECTS	Semester
TUSHEE4104	Renewable Energy	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
This course will focus on the practical application of renewable energy technologies. Topics include energy and resource conservation and project siting, economics, financing, renewable energy and tax credits, technical and engineering aspects, regulatory issues, energy storage, monitoring and verification. Students study the advantages, limitations, and potential of various energy sources. Wind, solar, small-scale hydro, ground-source heat pumps, combined heat and power, biofuels, fuel cells, and other technologies are examined. Students will learn the strategies and cost/benefit analyses employed by energy analysts to meet demand with clean energy production. Students will also complete their own study and proposal for a renewable energy project.			

*This is an elective course.

Module 40

Code	Course/Module Title	ECTS	Semester
TUSHEE4105	Digital Image Processing	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
This course also aims to: Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images. Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing, compression and analysis. Be able to write programs using MATLAB language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression. Have knowledge of the Digital Image Processing Systems. Be able to understand the documentation for, and make use of, the MATLAB library and Digital Image Processing Toolbox (IPT). Learn and understand the Image Enhancement in the Spatial Domain. Learn and understand the Image Enhancement in the Frequency Domain. Understand the Image Restoration, Compression, Segmentation, Recognition, Representation and Description.			

*This is an elective course.

Module 41

Code	Course/Module Title	ECTS	Semester
TUSHEE4200	Information Theory and Coding	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
This course also introduces the principles and applications of information theory: how information is measured in terms of probability and various entropies, how these are used to calculate the capacity of communication channels. Source coding schemes are also presented in this course to measure how much efficiency and redundancy reveal about each other. Channel Coding schemes including error correcting codes are studied in detail at the end of this course.			

Module 42

Code	Course/Module Title	ECTS	Semester
TUSHEE4201	Power System Analysis and Protections	8	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	93	107
Description			
This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding the principles of power system analysis, to perform simple analysis and assessment of system performance. From a system engineering perspective, we will find that the developments and advances of electrical power technologies are closely related to those of electrical engineering. For students who undertake studies in fields other than electrical and power generation. This course will provide an in-depth overview of the fundamentals as well as modern techniques and systems in the electrical power generation and distribution fields.			

Module 43

Code	Course/Module Title	ECTS	Semester
TUSHEE4202	Digital Signal Processing	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
This course provides an introduction to processing of discrete-time (DT) signals. Fundamental principles of DT systems and signals, in both time and Fourier domains, are presented. These are followed by modern applications of digital signal processing in electronic, computer and information engineering. Throughout the course, the focus is on developing techniques and algorithms for solving discrete-time signal processing problems.			

Module 44

Code	Course/Module Title	ECTS	Semester
TUSHEE4203	Graduation Project II	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	33	67
Description			
Preparatory studies of the literature and data collection for the graduation project in a particular area of concentration and under the supervision of one of the academic staff members. The course covers directed readings in the literature of Electrical engineering, introduction to research methods, seminar discussions dealing with special engineering topics of current interest. Planning, design, construction and management of an engineering project. Writing a technical report.			

Module 45

Code	Course/Module Title	ECTS	Semester
TUSHEE4205	English IV	2	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
The teaching of the course is delivered through a combination of lectures, online lectures, tutorials, and exercises, and preparing students for delivering their learning English outcomes in industry sectors.			

Module 46

Code	Course/Module Title	ECTS	Semester
TUSHEE4205	Fiber Optic Communication Systems	3	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3		48	102
Description			
This course gives an introduction of the principles and technologies of optical fiber communications and optical networks. It covers optical fiber waveguide theory, the structure and performance of active and passive optical devices, WDM technology, optical fiber communication systems, and the structures and key technologies of optical fiber information networks. The new technologies and developing trends of optical fiber communications.			

*This is an elective course.

Module 47

Code	Course/Module Title	ECTS	Semester
TUSHEE4206	Nanotechnology	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3		48	102
Description			
The course aims at introducing students to the nanotechnology as a new emerging field spanning specifically on physics and generally on the other branches of science and also Introducing tools and principles relevant at the nanoscale dimension. Discusses current and future nanotechnology applications in engineering, materials, physics, chemistry, biology, electronics, and energy. The objective tasks are performed through discussing the concepts of nanotechnology, the scale of nanotechnology and its imaging towards the fabrication of nanoworld and nanostructures. Additionally, the course describes geometry of nanoscales, the physical properties of nanostructures and their application in fabricating nanodevices.			

*This is an elective course.

Contact

Program Manager:
Ayad Atiyah ABDULKAFI | Ph.D. in Engineering | Assistant Prof.
Email: ayad_atiyah@tu.edu.iq
Mobile no.: +9647704066660

Program Coordinator:
Ghanim Thiab Hassan | MSC in Engineering | Assistant Prof.
Email: ganim.dyab@tu.edu.iq
Mobile no.: +9647831832647