First Cycle – bachelor's degree (B.Sc.)

Engineering Technical College

Department of Electrical Engineering Techniques

بكالوريوس في تقنيات الهندسة الكهربائية (الدورة الأولى)

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Electrical Engineering Techniques to gain the Bachelor of Science degree. The program delivers (48) Modules with (7200) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process and it Program Indications Summery is listed in Table. 1.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٠) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

Table 1 Program Indications Summery

Program Specifications	**(hr./ Program)**
Structured Student Workload	2359
Unstructured Student Workload	3641
Student Workload	6000
Summer Training	320
Total ECTS	240

2. Undergraduate Courses 2023-2024

Module: 1

Code	Course/Module Title	ECTS	Semester
EET1101	DC Electrical Circuits	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	106
Description			
The DC Electrical Circuits module is designed to provide a comprehensive understanding of direct current (DC) circuits and their components. The module covers fundamental concepts such as voltage, current, resistance, and power, and explores the relationships between these parameters. Students will learn about Ohm's Law and how to analyze simple series and parallel DC circuits using Kirchhoff's laws. The module also focuses on circuit analysis techniques, including node and mesh analysis, as well as the use of circuit theorems such as Thevenin's and Norton's theorems. Practical aspects of circuit design, such as voltage and current division, are also covered. Throughout the module, students engage in hands-on activities and problem-solving exercises to reinforce their understanding of DC circuits. They learn how to use basic measuring instruments such as multimeters and apply circuit analysis techniques to solve real-world problems. By the end of the module, students will have a solid foundation in DC electrical circuits, enabling them to analyze and design basic circuits and troubleshoot common issues in electronic systems.			

Module: 2

Code	Course/Module Title	ECTS	Semester
EET1102	Digital Technologies	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	106
Description			
The Digital Technologies module provides students with a comprehensive understanding of digital systems and their applications. The module covers various aspects of digital technologies, including binary representation, Boolean algebra, logic gates, and digital circuits. Students learn about the design and implementation of digital systems, including combinational and sequential circuits. They explore topics such as digital logic design, truth tables, Karnaugh maps, and state machines. The module also covers the basics of digital communication, data representation, and computer architecture. Practical hands-on activities are an integral part of the module, allowing students to gain experience in programming digital systems using hardware description languages (HDLs) such as VHDL or Verilog. They also learn how to use software tools for simulation and synthesis of digital circuits. By the end of the module, students will have a solid understanding of digital technologies and their applications, enabling them to design and analyze digital systems, digital devices, and comprehend the underlying principles of modern computing and communication systems.			

Module: 3

Code	Course/Module Title	ECTS	Semester
MTU1001	Arabic Language	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	0	32	18
Description			
The Arabic Language module for native Arabic speakers is designed to provide a strong foundation in Arabic language and develop language skills. The module caters to students who already have a proficiency in Arabic and focuses on enhancing their reading, writing, listening, and speaking abilities. The module covers advanced vocabulary and grammar, including the study of syntax and morphology, and emphasizes the development of analytical and critical thinking skills. Topics covered include Arabic literature, journalism, cultural heritage, and the use of Arabic in academic and professional domains. The module includes practical exercises and diverse activities aimed at enhancing language skills and expanding vocabulary. This includes reading various texts, such as classical and contemporary Arabic literature, writing expressions and essays, and engaging in discussions and seminars in Arabic. By the end of the module, students will have advanced language skills in Arabic, including the ability to read and comprehend diverse texts, express ideas fluently, and communicate confidently in academic and professional settings. These skills will enable them to explore deeper into Arabic culture and actively engage in the Arabic-speaking community and the Arab world.			

Module: 4

Code	Course/Module Title	ECTS	Semester
EET1104	Differential Mathematics	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	93	57
Description			
The Differential Mathematics module is designed to provide students with a solid foundation in the principles and techniques of differential calculus. The module covers fundamental concepts such as limits, continuity, derivatives, and their applications. Students learn how to calculate derivatives of various functions, including polynomial, exponential, logarithmic, and trigonometric functions. They explore the concept of rates of change and apply the derivative to solve problems in fields such as physics, engineering, and economics. The module also covers topics such as optimization, related rates, and curve sketching. Students learn how to analyze functions and determine critical points, inflection points, and concavity. They gain an understanding of the applications of differential calculus in optimization problems and the interpretation of derivative graphs. Throughout the module, students engage in problem-solving activities and practice applying differentiation techniques to real-world scenarios. They also learn how to use mathematical software and graphing calculators to aid in their calculations and visualizations. By the end of the module, students will have a strong grasp of differential calculus, enabling them to analyze functions, determine rates of change, and solve optimization problems in various disciplines that require a mathematical understanding of change and variation.			

Module: 5

Code	Course/Module Title	ECTS	Semester
EETC101	Engineering Workshops	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
0	4	63	87
Description			
The Engineering Workshops module offers students hands-on experience and practical skills in various engineering disciplines. The module covers a range of workshops, including mechanical, electrical, and materials workshops, to provide a comprehensive understanding of engineering processes and techniques. Students engage in practical activities that involve the use of workshop tools, machinery, and equipment. They learn about workshop safety procedures, equipment operation, and proper handling of materials. The module focuses on developing skills in areas such as metalworking, woodworking, electrical circuit construction, and basic fabrication techniques. Through practical projects and exercises, students learn how to read technical drawings, measure and mark materials, assemble components, and troubleshoot basic engineering problems. They gain experience in using hand tools, power tools, and computer-controlled machinery. The module also emphasizes teamwork, communication, and problem-solving skills, as students often collaborate on projects and need to apply their knowledge in real-world scenarios. By the end of the module, students will have acquired practical skills and knowledge in engineering workshops, enabling them to effectively work with tools and equipment, understand engineering processes, and contribute to the implementation and fabrication of engineering projects.			

Module: 6

Code	Course/Module Title	ECTS	Semester
MTU1006	Human Rights and Democracy	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	0	32	18
Description			
The Human Rights and Democracy module aims to provide students with a comprehensive understanding of human rights principles and democratic systems. The module covers fundamental concepts such as the universality and indivisibility of human rights, as well as the importance of democratic governance in promoting and protecting these rights. Students learn about the historical development of human rights, including key international human rights instruments and the role of international organizations. They explore topics such as civil and political rights, economic and social rights, and the rights of vulnerable groups. The module also focuses on democratic principles, including the rule of law, separation of powers, free and fair elections, and the protection of individual freedoms. Students examine case studies and engage in discussions on democratic processes, governance structures, and the challenges faced by democratic societies. Through critical analysis and reflection, students develop a deeper understanding of the interplay between human rights and democracy, and the importance of both in fostering inclusive and just societies. By the end of the module, students will have a comprehensive knowledge of human rights principles, democratic systems, and the significance of their intersection. They will be equipped to engage in informed discussions, advocate for human rights, and actively participate in democratic processes in their communities and beyond.			

Module: 7

Code	Course/Module Title	ECTS	Semester
EET1201	Engineering Mechanics	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	2	64	86

Description

The Engineering Mechanics module provides students with a solid understanding of the principles and applications of mechanics in engineering. The module covers fundamental topics such as statics and dynamics, emphasizing the analysis of forces and motion in engineering systems. In the statics component, students learn how to analyze and calculate the equilibrium of particles and rigid bodies under the action of forces. They study concepts such as vectors, force systems, moments, and equilibrium conditions. The module covers topics like trusses, frames, and friction, enabling students to analyze the stability and balance of structures. In the dynamic's component, students explore the principles of motion, including linear and angular motion, kinematics, and kinetics. They learn how to calculate velocities, accelerations, and forces acting on objects in motion. The module covers topics such as Newton's laws of motion, work and energy, and impulse and momentum. The module incorporates problem-solving exercises and practical applications, allowing students to apply the principles of engineering mechanics to real-world scenarios. They develop skills in analyzing and solving engineering problems involving forces, motion, and equilibrium. By the end of the module, students will have a solid foundation in engineering mechanics, enabling them to analyze and design structures, machines, and mechanical systems, and understand the fundamental principles governing their behavior.

Module: 8

Code	Course/Module Title	ECTS	Semester
MTU1002	English Language (Beginner)	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	1	33	17

Description

The English Language (Beginner) module is designed to provide students with a solid foundation in the English language. The module caters to students who have little to no prior knowledge of English and focuses on developing their basic language skills. Students learn fundamental aspects of English, including vocabulary, grammar, pronunciation, and basic sentence structure. The module covers essential topics such as greetings, introductions, numbers, colors, daily routines, and common expressions. The module emphasizes interactive activities and practice exercises to enhance listening, speaking, reading, and writing skills. Students engage in role-plays, dialogues, and group discussions to develop their conversational abilities and build confidence in using English in practical situations. Additionally, the module introduces basic reading comprehension skills and provides exposure to simple texts and exercises to improve reading comprehension.
By the end of the module, students will have developed a basic understanding of the English language, allowing them to communicate in simple everyday situations, comprehend basic written texts, and lay a foundation for further language learning and proficiency.

Module: 9

Code	Course/Module Title	ECTS	Semester
EETC102	Engineering Drawing	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
0	4	63	62
Description			
The Engineering Drawing module provides students with the skills and knowledge necessary for creating accurate and detailed technical drawings used in engineering design and manufacturing processes. The module covers various aspects of engineering drawing, including orthographic projection, isometric projection, and dimensioning. Students learn how to interpret and create drawings that accurately represent three-dimensional objects on a two-dimensional plane. They gain proficiency in using drawing tools and software to create precise and dimensioned drawings that adhere to industry standards and conventions. The module also focuses on understanding engineering symbols, annotations, and tolerances, as well as interpreting engineering drawings and specifications. Students learn about different types of engineering drawings, such as assembly drawings, part drawings, and detail drawings, and how they relate to the overall design process. Practical exercises and projects are an essential component of the module, allowing students to apply their knowledge and skills to real-world engineering drawing scenarios. By the end of the module, students will be proficient in creating and interpreting engineering drawings, enabling them to effectively communicate design ideas, collaborate with other engineers, and contribute to the manufacturing and fabrication processes in various engineering disciplines.			

Module: 10

Code	Course/Module Title	ECTS	Semester
EET1204	AC Electrical Circuits	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	106
Description			
The AC Electrical Circuits module focuses on providing students with a foundation in basic AC circuit theory and analysis. The module covers essential topics related to AC circuits and their applications. Students learn about AC voltage, current, and the characteristics of sinusoidal waveforms. They study the behavior of passive circuit elements such as resistors, capacitors, and inductors in AC circuits. The module covers concepts such as impedance, reactance, and phasor representation. The module emphasizes the analysis of basic AC circuit configurations, including series and parallel AC circuits. Students learn how to calculate voltages, currents, and power in these circuits using Ohm's law, Kirchhoff's laws, and complex arithmetic techniques. Additionally, the module introduces concepts such as power factor and power factor correction in AC circuits. Students gain an understanding of the relationship between voltage, current, power, and energy in AC circuits. By the end of the module, students will have a solid understanding of basic AC electrical circuits, allowing them to analyze simple AC circuits, calculate circuit parameters, and apply this knowledge to practical circuit design and troubleshooting tasks.			

Module: 11

Code	Course/Module Title	ECTS	Semester
EET1205	Integral Mathematics	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	93	57

Description

The Integral Mathematics module is designed to provide students with a comprehensive understanding of integral calculus and its applications. The module covers fundamental concepts such as indefinite integrals, definite integrals, and the fundamental theorem of calculus.
Students learn various integration techniques, including substitution, integration by parts, and partial fractions. They study the properties of integrals and apply them to solve problems in areas such as finding areas under curves, calculating volumes, and evaluating improper integrals. The module also explores applications of integrals in physics, engineering, economics, and other fields. Students learn how to model real-world problems using integrals and apply integration to solve optimization and related rate problems. Through theoretical study and problem-solving exercises, students develop proficiency in integral calculus. They learn how to set up and solve integral equations, interpret the results in practical contexts, and utilize technology such as graphing calculators or computer software to aid in calculations. By the end of the module, students will have a solid understanding of integral calculus, enabling them to solve a wide range of mathematical problems involving integration and apply their knowledge to various scientific and engineering applications.

Module: 12

Code	Course/Module Title	ECTS	Semester
MTU1004	Computer Principles	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	2	49	26

Description

The Computer Principles module provides students with a fundamental understanding of the key principles and concepts underlying computer systems and technology. The module covers essential topics such as computer architecture, data representation, algorithms, and programming.
Students learn about the components of a computer system, including the CPU, memory, storage devices, and input/output devices. They explore how data is represented and manipulated using binary digits, and study number systems, logic gates, and Boolean algebra. The module introduces algorithm design and analysis, teaching students how to develop step-by-step procedures to solve problems efficiently. They learn about programming constructs such as variables, control structures, functions, and data types. Furthermore, the module covers topics such as operating systems, networks, computer security, and ethical considerations in computing. Through theoretical study and practical exercises, students develop an understanding of computer principles and gain hands-on experience with programming languages and software tools.
By the end of the module, students will have a solid foundation in computer principles, allowing them to comprehend the inner workings of computer systems, develop basic algorithms and programs, and make informed decisions related to computer hardware, software, and security.

Module: 13

Code	Course/Module Title	ECTS	Semester
EET2101	DC Generators	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	56

Description

The DC Generators module covers key concepts related to magnetic circuits, electromechanical energy conversion, and DC machines. It begins with an introduction to magnetic circuits, including topics such as magneto-motive force, magnetic field strength, permeability, reluctance, and the analogy between electric and magnetic circuits. The module also explains the B-H curve, hysteresis, eddy current, and series and parallel magnetic circuits. Additionally, it explores practical magnetic circuits, permanent magnets, and their applications. The module further delves into electromechanical energy conversion principles and the functioning of DC machines. It covers armature winding terms, including single and double-layer windings, lap and wave windings, multiplex windings, equalizer rings, dummy coils, and armature winding resistance. The module then focuses on DC generators, discussing the production of induced electromotive force (EMF), factors affecting generator EMF, armature reaction, demagnetizing and cross-magnetizing armature reaction, compensating windings, commutation, methods for improving commutation, and the role of interpoles and commutating poles. Various types of DC generators are explored, including self-excited, series, shunt, short-shunt compound, and long-shunt compound generators. The characteristics of shunt, series, and compound generators, as well as losses, efficiency, and conditions for maximum efficiency, are also covered. Finally, the module addresses parallel operation of shunt generators, load division, and voltage division in parallel series generators.

Module: 14

Code	Course/Module Title	ECTS	Semester
EET2102	Electronic Essentials	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	3	79	46

Description

The Electronic Essentials module focuses on providing students with a fundamental understanding of key electronic components such as diodes, transistors, and thyristors. Students learn about the characteristics, operation principles, and practical applications of these components. The module covers diode circuits, including rectifiers and voltage regulators, as well as transistor configurations, amplification principles, and switching applications. They also study thyristors, including their characteristics and applications in power control and AC switching. Through theoretical study, hands-on experiments, and practical exercises, students gain proficiency in understanding, analyzing, and designing circuits using these components. By the end of the module, students will have a solid foundation in working with diodes, transistors, and thyristors, enabling them to analyze and design basic electronic circuits and apply their knowledge to real-world applications. By the end of the module, students will have a solid understanding of the basic electronic components, allowing them to analyze and design circuits involving diodes, transistors, and thyristors. They will be equipped with the knowledge and skills necessary to work with these components in various electronic applications, such as power supplies, amplifiers, and digital circuits.

Module: 15

Code	Course/Module Title	ECTS	Semester
EET2103	Electrical Circuit Analysis	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	3	79	46
Description			
The Electrical Circuit Analysis module is a 15-week course that focuses on the principles and techniques of analyzing electrical circuits. This module provides students with a solid foundation in circuit analysis, enabling them to understand and solve complex electrical circuits encountered in engineering applications. The module begins with an introduction to basic circuit analysis, covering topics such as Ohm's Law, Kirchhoff's Laws, and resistors in series and parallel. Students will then explore DC and AC circuits, learning about network reduction, theorems (such as Superposition, Thevenin's, and Norton's Theorem), and power calculations. The course progresses to the study of transient response analysis, resonance phenomena, coupled circuits, multi-port networks, and three-phase circuits. Students will develop the skills to analyze and interpret transient responses, understand resonance behavior, work with coupled circuits, and analyze three-phase circuits. They will also gain proficiency in performing power calculations, including power factor calculations. Throughout the module, problem-solving skills and the practical application of various analysis techniques are emphasized. Students will become adept at simplifying circuits, determining equivalent parameters, and utilizing theorems for circuit analysis. By the end of the module, students will have a solid understanding of electrical circuit analysis and the ability to confidently apply their knowledge to solve complex engineering problems.			

Module: 16

Code	Course/Module Title	ECTS	Semester
EET2104	Sensors	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	2	64	36
Description			
The Electrical Engineering Sensors module offers a comprehensive understanding of sensors used in electrical engineering. Students will explore various sensor types, their operating principles, and applications in electrical systems. Topics covered include temperature sensors (thermocouples, RTDs, thermistors), light sensors (photodiodes, phototransistors, LDRs), strain gauges, load cells, pressure sensors, position and displacement sensors (potentiometers, encoders, LVDTs), magnetic sensors (Hall effect, magnetoresistive), accelerometers, gyroscopes, proximity sensors, current sensors, and voltage/power sensors. Practical exercises, laboratory experiments, and projects will allow students to apply sensor knowledge in real-world scenarios. Upon completion, students will possess the skills to select, integrate, and troubleshoot sensors effectively, preparing them for careers in electrical engineering fields where sensors play a crucial role.			

Module: 17

Code	Course/Module Title	ECTS	Semester
EET2105	Applied Mathematics	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	78	47
Description			
The Applied Mathematics module provides students with a comprehensive understanding of key mathematical concepts and techniques applicable to various engineering and scientific fields. This 15-week module covers Vector Analysis, Curve Sketching, Complex Numbers, Series, Multiple Integrals, Coordinate Geometry, Ordinary Differential Equations (ODE), Partial Differential Equations (PDE), and Laplace Transforms. Students will explore Vector Analysis, learning vector operations, lines, planes, and vector-valued functions. They will develop skills in Curve Sketching, understanding the behavior of functions and identifying important features. Complex Numbers will be studied, including their representation in the complex plane and applications in engineering problems. Series and Multiple Integrals will be covered, focusing on convergence, approximation, and applications in physics and engineering. Coordinate Geometry will introduce conic sections, polar coordinates, and parametric equations, enabling students to analyze various plane curves. The module delves into Ordinary Differential Equations (ODE), providing techniques to solve first-order linear and separable equations. Students will also study Partial Differential Equations (PDE), including separation of variables and the wave and heat equations. Additionally, they will learn about Laplace Transforms and their applications in solving ODEs. Throughout the module, students will engage in problem-solving exercises, practical applications, and hands-on activities to reinforce their understanding and enhance their mathematical skills. By the end of the module, students will have a solid foundation in applied mathematics, enabling them to tackle complex engineering and scientific problems with mathematical rigor and confidence.			

Module: 18

Code	Course/Module Title	ECTS	Semester
MTU1005	Computer Applications	3	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	2	49	26
Description			
The Computer Programming module equips students with the necessary skills to proficiently use Microsoft Word, Excel, and PowerPoint. In the Word component, students learn document creation, formatting, and graphics integration. The Excel segment covers spreadsheet organization, data entry, formulas, and data analysis techniques. Students also delve into PowerPoint, gaining expertise in designing engaging presentations with multimedia elements and animations. Through hands-on exercises and practical projects, students apply their knowledge to real-world scenarios, enhancing their communication and presentation abilities. By the end of the module, students will have developed proficiency in Word, Excel, and PowerPoint, enabling them to create professional documents, analyze data effectively, and deliver impactful presentations in academic			

and professional settings. This module empowers students with essential computer programming skills that are highly valued in today's digital workplace.

Module: 19

Code	Course/Module Title	ECTS	Semester
MTU1007	Baath Party Crimes of the Ba'ath regime in Iraq	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	0	32	18
Description			

Module: 20

Code	Course/Module Title	ECTS	Semester
EET2201	DC Motors	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	56
Description			

The DC Motor Module provides a comprehensive understanding of direct current (DC) motors and their operation. Starting with the fundamental principles of DC motors, the module explores topics such as the back electromotive force (EMF) equation, voltage equation, torque development, and reversing the direction of rotation. The module delves into various aspects of torque, including armature torque, shaft torque, and torque characteristics. Dynamic behavior of DC motors is examined, along with an exploration of different types of DC motors and their specific characteristics. Losses, efficiency, maximum efficiency, and maximum power are discussed, providing insights into optimizing motor performance.

The module covers DC motor starting methods, including direct starting, armature resistance starting, and special methods. Stopping techniques such as electric braking, plugging, rheostat braking, and regenerative braking are also explained, along with their impact on the motor's mechanical time constant. Speed control methods, including field control, voltage control, and armature resistance control, are explored. Additionally, an introduction to solid-state devices for

DC motor control is provided.
The module includes testing methods such as brake tests, Swinburne's test, temperature rise tests, and Hopkinson's test, which aid in motor performance evaluation. Finally, applications of DC motors in various industries and contexts are discussed, highlighting their importance and versatility.

Module: 21

Code	Course/Module Title	ECTS	Semester
EET2202	Electronic Circuits	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	3	79	46

Description

The Electronic Circuits module covers a wide range of topics related to electronic circuits. Students will learn about voltage multiplier circuits such as voltage doublers, triplers, and quadruplers. The module also explores the fixed bias circuit configuration for bipolar junction transistors (BJTs), as well as emitter resistance biasing and divider bias techniques. Field-effect transistors (FETs) are covered extensively, including JFETs, depletion-mode MOSFETs, and enhancement-mode MOSFETs. Students will study FET biasing methods to establish optimal operating conditions. The module also includes topics on small signal amplifiers, hybrid equivalent models, power amplifiers, and various classes of amplifiers such as Class A, Class B, Class AB, and Class C & D. Additionally, students will learn about thyristors and their applications. Throughout the module, students will gain a thorough understanding of electronic circuit principles, biasing techniques, amplifier design, and the characteristics and applications of different types of transistors. This knowledge will enable them to analyze, design, and troubleshoot electronic circuits in various applications.

Module: 22

Code	Course/Module Title	ECTS	Semester
EET2203	Advanced Electrical Circuits Analysis	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	3	79	46

Description

The Advanced Electrical Circuit Analysis module is a 15-week course that builds upon the foundational knowledge gained in the Electrical Circuit Analysis module. This module focuses on advanced topics in circuit analysis, providing students with the tools and techniques to analyze and design complex electrical circuits encountered in engineering applications. The module begins with an in-depth study of transient analysis, covering both DC and AC transients. Students will learn to analyze the transient behavior of RL, RC, and RLC circuits, calculate time constants, and determine circuit responses. They will gain a comprehensive understanding of transient phenomena in energy storage elements and sinusoidal circuits. Next, the module explores the principles of two-port networks. Students will learn about the characteristics and parameters of two-port networks, analyze and model these networks, and apply them in circuit design. They will develop proficiency in working with complex networks and understanding their behavior

using graph theory and network topology. The module also covers frequency response analysis, including Bode plots and frequency-domain analysis. Students will study resonance phenomena and its implications in circuit design. They will gain the skills to analyze circuit responses in the frequency domain, determine bandwidths, and optimize circuit performance.

Module: 23

Code	Course/Module Title	ECTS	Semester
EET2204	Instruments and Measurements	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	3	79	71
Description			

The Instruments and Measurements module focuses on the principles and applications of measuring instruments in engineering and scientific fields. Students begin by understanding systems of units, including the International System of Units (SI), electrical standards, and time and frequency standards. They learn about measurement principles, error classification, and techniques for minimizing errors. The module covers PMMC-based measuring instruments, such as galvanometers, discussing their construction, calibration, and applications. Students also explore the design and calculation of multi-range DC voltmeters and ammeters, as well as rectifier-type instruments for measuring AC quantities. Design considerations for multi-range AC voltmeters and ammeters are examined. The module delves into the design and calculation of series-type and shunt-type ohmmeters, considering factors such as sensitivity and loading effects. Students also learn about transducers and their role in converting physical quantities to electrical signals. The calibration of DC instruments, including voltmeters, ammeters, and ohmmeters, is covered. Students gain practical experience through exercises, calculations, and laboratory experiments. By the end of the module, students will have a solid understanding of measurement systems, instrument design, and calibration techniques, enabling them to effectively use and troubleshoot a variety of measuring instruments.

Module: 24

Code	Course/Module Title	ECTS	Semester
EET2205	Engineering Analysis	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	78	72
Description			

The Engineering Analysis module provides a comprehensive understanding of mathematical techniques used in engineering analysis. It covers topics such as ordinary differential equations, Fourier series, Laplace transforms, solution of linear algebraic systems, and Z-transforms. In the revision of ordinary differential equations, students learn about first-order and second-order simultaneous differential equations. Fourier series topics include periodic functions, non-periodic functions, even and odd functions, and the complex form of Fourier series. Laplace transforms are introduced, covering properties, applications, and techniques for inverse transforms. The module also explores the solution of differential equations, simultaneous differential equations, and their applications in electrical engineering. Students gain knowledge of direct and indirect methods for solving linear algebraic systems, including matrix operations, Gaussian elimination, and Jacob's

method. They also study the Z-transform, its properties, region of convergence, and inverse transforms. By the end of the module, students will have a solid foundation in these mathematical techniques and their applications in engineering analysis.

Module: 25

Code	Course/Module Title	ECTS	Semester
MTU1003	English Language (Intermediate)	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	1	33	17
Description			

The English Language (Intermediate) module is designed to take students at the intermediate level of English language proficiency and further develop their skills. The module covers a range of engaging topics and language areas to ensure a well-rounded language learning experience.
Students will explore units such as "Famous Couples," "Do's and Don'ts," "Going Places," "Scared to Death," "Things that Changed the World," "Dreams and Reality," "Earning a Living," and "Love You and Leave You." These units provide a diverse set of themes that encourage students to engage in discussions, express opinions, and expand their vocabulary and grammar knowledge.
The module incorporates a variety of interactive activities, listening exercises, reading texts, and writing tasks to enhance the four language skills: speaking, listening, reading, and writing. Students will also develop their grammar accuracy, pronunciation, and fluency through guided practice and communication tasks.
Overall, the English Language (Intermediate) module aims to equip students with the necessary language skills and cultural understanding to confidently communicate in real-life situations, both in academic and professional contexts.

Module: 26

Code	Course/Module Title	ECTS	Semester
EET3101	Principles of Power Engineering	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	4	109	41
Description			

The Principles of Power Engineering module is an introductory course that covers fundamental concepts in the field of power engineering. It focuses on electrical power systems and their components. The module includes topics such as the basic structure of power systems, overhead line insulators, corona, sag in overhead lines, line inductance, line capacitance, and short, medium, and long transmission lines. Students will learn about the overall structure and components of power systems, including power generation, transmission, and distribution. They will study the role and types of insulators used in overhead power lines, as well as the phenomenon of corona and its effects. The module will also cover sag in overhead lines and its calculation methods. Students will gain an understanding of line inductance and capacitance and their impact on power system behavior. Additionally, they will explore the characteristics and analysis techniques specific to short, medium, and long transmission lines. Overall, this module provides a foundation for comprehending power system operation, design, and analysis.

Module: 27

Code	Course/Module Title	ECTS	Semester
EET3102	DC Power Conversions	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	79	46
Description			
The DC Power Converter module focuses on power semiconductor devices and their applications in converting electrical power. It covers topics such as the construction, characteristics, and operation of power semiconductor devices. Specifically, it delves into the fundamentals of thyristors, including their construction, working principles, turn-on and turn-off methods, and firing circuits. The module also explores AC to DC converters, including phase-controlled converter operations such as single-phase half-wave and full-wave converters, as well as three-phase half-wave and full-wave converters. Power factor improvement techniques and the operation of these converters with different load types are also discussed. Additionally, the module covers DC to DC converters, specifically focusing on the basic principles of DC choppers. It includes the classification of DC choppers and various control strategies employed in these converters. Overall, the module provides students with a comprehensive understanding of power semiconductor devices and their application in AC to DC and DC to DC power conversion. Students will gain knowledge about different converter topologies, control techniques, and their practical implementation.			

Module: 28

Code	Course/Module Title	ECTS	Semester
EET3103	Electrical Transformers and Induction Machines	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The "Electrical Transformers and Induction Machines" module offers a comprehensive study of two essential components in electrical systems. This module provides students with a deep understanding of power transformers and induction motors, exploring their construction, theory, operation, and practical applications. Starting with power transformers, students learn about their basic construction, ideal transformer theory, practical considerations, equivalent circuits, transformer tests, parallel operation, and instrument transformers. They gain knowledge about the core, windings, insulation, cooling systems, and factors affecting efficiency. The module covers transformer testing techniques and the parallel operation of transformers, including both single-phase and three-phase configurations. Students also study instrument transformers used for precise measurement and protection in power systems. Moving on to induction machines, students delve into the construction, theory, and characteristics of induction motors. They explore topics such as electromagnetic induction, motor torque, slip, equivalent circuits, starting methods, speed control techniques, and single-phase induction motors. The module also introduces linear induction machines and their unique applications. By combining the study of electrical transformers and induction machines, students develop a comprehensive understanding of these crucial components in electrical systems. They gain the knowledge necessary for designing, operating, and maintaining transformer and induction machine systems,			

equipping them with valuable skills for various electrical engineering applications.

Module: 29

Code	Course/Module Title	ECTS	Semester
EET3104	Electromagnetic Fields	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	0	48	77

Description

The Electromagnetic Fields module covers a range of topics related to electromagnetic phenomena. Students begin with vector analysis, exploring vector operations and their application to electromagnetics. They then delve into electrostatics, studying electric fields, potential, and capacitance. The module covers conductor and dielectric behavior, Poisson's and Laplace's equations, and steady magnetic fields, including Ampere's law. Students also learn about magnetic forces and the interaction between magnetic fields and moving charges. Time-varying fields and Maxwell's equations are examined, including Faraday's law of electromagnetic induction and the displacement current. The module concludes with the study of uniform plane waves, including their properties and characteristics. Throughout the module, students engage in mathematical calculations, problem-solving exercises, and practical examples to deepen their understanding of electromagnetic fields. By the end of the module, students will have a solid foundation in vector analysis, electrostatics, magnetic fields, and Maxwell's equations, enabling them to analyze and solve a wide range of electromagnetic problems.

Module: 30

Code	Course/Module Title	ECTS	Semester
EET3105	Microprocessor	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	1	64	36

Description

The 8086 Microprocessor module covers the essential aspects of the Intel 8086 microprocessor architecture and programming. Students are introduced to the fundamental concepts of microprocessors and their applications. They learn about the internal architecture of the 8086 processor, including its registers, instruction set, and memory organization. Topics covered include memory segmentation, addressing modes, and data transfer instructions. Students also explore the various addressing modes and their application in programming. They gain hands-on experience in writing and executing assembly language programs using the 8086-instruction set. The module covers topics such as arithmetic and logical operations, control flow instructions, and interrupt handling. Students also learn about input/output (I/O) operations and interfacing external devices with the microprocessor. Throughout the module, students engage in practical exercises and programming assignments to reinforce their understanding of the 8086 microprocessor and its programming capabilities. By the end of the module, students will have a solid understanding of the 8086-microprocessor architecture and the ability to write efficient assembly language programs for a wide range of applications.

Module: 31

Code	Course/Module Title	ECTS	Semester
EET3106	Numerical Analysis	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	1	48	27
Description			
The Numerical Analysis module provides students with a comprehensive understanding of numerical methods and techniques used in data analysis and problem-solving. The module covers various topics, including error analysis and data uncertainty, roots finding of nonlinear equations using methods like graphical, bisection, false position, and Newton-Raphson. Students will also learn about interpolation and curve fitting techniques such as polynomial interpolation, cubic spline, and linear and non-linear regressions. The module further explores numerical solutions for differentiation and integration, including numerical differentiation techniques like Richardson extrapolation and Newton forward formula, as well as integration methods like the trapezoid rule and Simpson's rule. Students will also study numerical solutions for ordinary differential equations using methods like Euler's method, Runge-Kutta method, and Milne's method. The module concludes with an introduction to numerical solutions for partial differential equations, specifically boundary value problems for 2nd order elliptic partial differential equations. Throughout the module, students will apply these numerical methods to solve real-world problems in various fields, including electrical engineering and scientific computations. They will gain hands-on experience through practical exercises and simulations, enhancing their analytical and problem-solving skills in a numerical context.			

Module: 32

Code	Course/Module Title	ECTS	Semester
EET3201	Advanced Power Engineering	7	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	4	109	66
Description			
The Advanced Power Engineering module covers several key topics in power systems and electrical engineering. Students will delve into the design, installation, and operation of underground cables, as well as learn about the per unit method for simplifying calculations. They will explore single line diagrams to analyze power system configurations and interpret impedance and reactance diagrams for fault analysis. The module also includes a study of symmetrical components, focusing on positive, negative, and zero sequence reactance diagrams. Lastly, students will gain knowledge about HVDC transmission systems and their principles, components, and control strategies. Through theoretical study and practical examples, students will develop a comprehensive understanding of these advanced power engineering concepts. The module aims to equip students with the necessary skills and knowledge to tackle complex challenges in power systems and electrical engineering.			

Module: 33

Code	Course/Module Title	ECTS	Semester
EET3202	AC Power Conversions	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	56

Description

The AC Power Converter module focuses on the conversion of DC power to AC power using different types of inverters. It covers various topics related to DC to AC converters, including voltage source inverters, current source inverters, AC and DC static switches, and resonant pulse inverters. The module explores voltage source inverters, which convert DC voltage into a variable frequency AC output. It discusses their operation, control strategies, and applications. Similarly, current source inverters are studied, which convert a DC current into an AC output. AC and DC static switches are also covered, which are electronic switches used for power conversion and control purposes. The module examines their characteristics, types, and applications. Resonant pulse inverters are discussed, including series resonant inverters, parallel resonant inverters, class E resonant inverters, and various zero-current-switching and zero-voltage-switching resonant converters. These inverters utilize resonant circuits to achieve efficient power conversion.

Lastly, the module introduces uninterruptible power supplies (UPS), which are devices that provide backup power during electrical grid failures. The different types of UPS systems, their operation, and their importance in power systems are explored.

Overall, the AC Power Converter module provides students with a comprehensive understanding of DC to AC power conversion techniques, including inverters, static switches, resonant pulse inverters, and UPS systems. Students will gain knowledge about their operation, control methods, and applications in various power systems.

Module: 34

Code	Course/Module Title	ECTS	Semester
EET3203	Synchronous and Special Machines	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46

Description

The Synchronous and Special Machines module provides students with a comprehensive understanding of synchronous machines and various special types of motors. The module covers topics such as the basic construction and theory of synchronous machines, including alternators and methods of determining voltage regulation. Students will also learn about the parallel operation of alternators and the characteristics and power relations of synchronous motors, including V curves. The module further explores special types of machines, including linear synchronous machines, stepper motors, permanent magnet motors (both DC and synchronous), servomotors (both DC and AC), reluctance motors, switched reluctance motors, brushless DC motors, hysteresis motors, and linear induction motors. Students will study the operating principles, characteristics, and applications of these special machines. Throughout the module, students will gain practical knowledge through hands-on exercises and experiments, allowing them to understand the performance, control, and applications of synchronous and special machines in various engineering fields. They will develop skills in analyzing and designing these machines, as well as troubleshooting and maintenance.

Module: 35

Code	Course/Module Title	ECTS	Semester
EET3204	Digital Controllers	7	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
4	2	109	66
Description			
Digital Controllers module provides an in-depth understanding of digital controllers and their applications in various industries. The course is divided into several key topics that cover the fundamental principles, programming techniques, and practical implementation of digital controllers. During the initial weeks, students will be introduced to single-chip microcontrollers, their architecture, and different types. They will learn about the internal structure, pin functions, and memory organization of microcontrollers. Additionally, students will explore the concept of Integrated Development Environment (IDE) and its various components such as assemblers, compilers, simulators, and debuggers. The module then focuses on microcontroller interfacing, covering topics like sensors, analog-to-digital (A/D) and digital-to-analog (D/A) conversion, and I/O instructions. Students will learn how to interface microcontrollers with different types of sensors and actuators. The next phase of the module introduces Programmable Logic Controllers (PLC) and their industrial applications. Students will gain a comprehensive understanding of PLC operation principles, ladder diagrams, processors, memory systems, and power supply. The module further delves into PLC programming, covering topics like timers, counters, arithmetic operations, flow control instructions, and system programming. Students will develop skills in designing control strategies and implementing them using ladder relay programming. Finally, students will explore real-world industrial applications of PLCs, including drilling machines, package sorting, injection molding, bottle filling, and X-Y dispensers. Throughout the module, students will engage in practical exercises, programming assignments, and case studies to reinforce their understanding of digital controllers and their applications.			

Module: 36

Code	Course/Module Title	ECTS	Semester
EET4101	Transmission and Distribution Systems	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
This module focuses on the fundamental concepts and principles related to electric power supply systems, transmission lines, and power distribution systems. The module covers a range of topics that are essential for understanding the efficient and reliable delivery of electricity. Students will learn about different types of conductor materials used in power transmission, their characteristics, and the factors to consider when selecting conductor sizes based on Kelvin's law. The module also delves into the importance of grounding systems and their role in electrical safety and system performance. The performance of transmission lines, including line losses, impedance, and voltage drop, is explored to understand the efficient transfer of electrical power over long distances. Additionally, students will gain knowledge about power distribution systems, including the various components and configurations used to deliver electricity to end consumers. Throughout the module, students will examine case studies and real-world examples to gain practical insights into the design, operation, and maintenance of transmission and distribution systems. They will also explore emerging trends and technologies in the field, such as smart grids and renewable energy integration. By the end of the module, students will have a solid understanding of electric power supply systems, transmission line characteristics, power distribution systems, and the factors influencing their performance. They will be equipped with the			

necessary knowledge to analyze, design, and manage efficient and reliable transmission and distribution systems.

Module: 37

Code	Course/Module Title	ECTS	Semester
EET4102	Electric Machine Drive	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Electric Machine Drive module focuses on the principles, operation, and control of electric machines used in various drive systems. It covers both the theoretical and practical aspects of electric machine drives, providing students with a comprehensive understanding of their applications in different industries. The module begins with an introduction to electric machines, including DC machines, induction machines, and synchronous machines. Students will learn about their construction, working principles, and characteristics. The module then delves into the fundamentals of electric machine control, including speed control, torque control, and efficiency optimization techniques. Students will study different types of electric machine drives, such as variable frequency drives (VFDs), servo drives, and stepper motor drives. They will explore the principles of operation, control strategies, and practical implementation of these drives in various industrial applications. The module also covers important topics related to electric machine drive systems, such as power electronic converters, motor starting methods, braking techniques, and regenerative braking. Students will gain insights into the selection, sizing, and integration of electric machines and drives in different systems. Throughout the module, students will have the opportunity to work with simulation tools and laboratory experiments to reinforce their theoretical knowledge and develop practical skills in electric machine drive systems. They will also explore emerging trends in electric machine drives, such as energy efficiency, power factor correction, and integration with renewable energy sources			

Module: 38

Code	Course/Module Title	ECTS	Semester
EET4103	Power Systems Analysis	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Power Systems Analysis module provides a comprehensive study of electric power systems with a focus on analysis techniques. Students will learn about the per unit system, which simplifies calculations by normalizing quantities, and how to formulate node equations and construct single line diagrams to analyze power flow. The module covers impedance and reactance diagrams to understand the behavior of power systems and introduces the concept of bus admittance and impedance matrices for network calculations. Power flow problems are addressed, and the Gauss-Seidel method is taught as a solution technique. Symmetrical faults, which are faults that affect all three phases equally, are discussed, including fault current analysis and the impact of faults on system performance. By the end of the module, students will have a strong foundation in power flow analysis, and fault analysis. They will be able to analyze power systems, identify potential issues, and make informed decisions to ensure the reliable and			

efficient operation of electrical power networks. Practical applications and real-world examples are used throughout the module to reinforce the theoretical concepts.

Module: 39

Code	Course/Module Title	ECTS	Semester
EET4104	Electric Power Generation Stations	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46

Description

The Electric Power Generation Stations module provides a comprehensive study of various types of power stations and their essential components. Students will be introduced to thermal power stations, hydro-electric stations, diesel electric stations, nuclear power stations, and gas turbine plants. The module covers the working principles, operational characteristics, and major equipment associated with each type of power station. Thermal power stations use fossil fuels to generate electricity, while hydro-electric stations harness the power of water. Diesel electric stations rely on diesel engines, nuclear power stations utilize nuclear reactions, and gas turbine plants employ gas turbines for power generation. Students will learn about the advantages, limitations, and environmental impact of each type of power station.

The module also addresses the combined operation of power systems and the challenges posed by variable loads. Students will gain an understanding of major electrical equipment used in power stations, such as transformers, generators, and switchgear. By the end of the module, students will have a solid foundation in electric power stations, enabling them to analyze power systems, assess their performance, and make informed decisions in the field of electric power engineering.

Module: 40

Code	Course/Module Title	ECTS	Semester
EET4105	Control Systems Analysis	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46

Description

The Control System Analysis module provides a comprehensive study of control systems and their analysis techniques. It begins with an introduction to control systems, including their basic concepts and components. Students will learn about transfer functions, which describe the relationship between input and output signals in a system. Block diagram reduction techniques will be covered, allowing students to simplify complex control system diagrams. Signal flow graphs and the Mason rule will be introduced as graphical tools for analyzing control systems. The module also covers multivariable systems and transfer matrices, which are used to represent interconnected systems. State space theory and representation will be explored, offering an alternative approach to analyzing control systems. Modern control system concepts will be discussed, highlighting the advancements in control theory and design techniques. Time domain analysis techniques will be covered, including stability analysis using methods such as Routh stability analysis and the root locus method. By the end of the module, students will have a solid understanding of control system analysis techniques and will be able to analyze the stability and performance of control systems using various methods.

Module: 41

Code	Course/Module Title	ECTS	Semester
EET4106	Project 1	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
0	6	93	32
Description			
Project 1 module stands for Final Year Project Planning, literature reviewing and Proposal. This module focuses on the initial stages of the final year project, including project planning, topic selection, and proposal development. Students will engage in a literature review to understand the existing knowledge and identify research gaps. They will define the objectives and scope of their project, design a methodology or experimental setup, and create a project proposal outlining their plans. Emphasis will be placed on developing research and project management skills, as well as effective communication through written documentation.			

Module: 42

Code	Course/Module Title	ECTS	Semester
MTU1008	Professional Ethics	3	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	1	48	27
Description			
This module provides a comprehensive understanding of engineering ethics, professional responsibilities, and ethical decision-making in the engineering profession. Students will explore the importance of ethics in engineering and the various ethical theories and frameworks that guide ethical decision-making. They will learn about codes of ethics and professional conduct that govern the engineering profession. The module covers a wide range of topics, including professional responsibility and accountability, the social and environmental impact of engineering, conflicts of interest and ethical dilemmas, ethical issues in research and innovation, engineering and public safety, ethical leadership and professional integrity, global and cultural perspectives in engineering ethics, ethical issues in emerging technologies, and ethical responsibilities to clients, colleagues, and society. Through case studies and ethical reflection, students will analyze real-world scenarios and develop the skills to make ethical decisions in their engineering practice. The module emphasizes the importance of lifelong learning and ethical competence, encouraging students to engage in continuous professional development and stay abreast of ethical challenges in the rapidly changing technological landscape. Assessment may include a final project or examination that tests students' understanding of engineering ethics principles and their applications.			

Module: 43

Code	Course/Module Title	ECTS	Semester
ET4202	Power Systems Protection	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
This module provides a comprehensive understanding of protection systems in electrical power systems. It covers essential topics such as circuit breakers, the requirements of a protection system, main and backup protection, protective relays, and the protection of transmission lines, alternators, and transformers. Students will learn about the different types and operating principles of circuit breakers, which are crucial components for interrupting fault currents and protecting electrical systems from damage. They will also explore the key requirements of an effective protection system, including selectivity, sensitivity, and reliability. The module emphasizes the importance of main and backup protection to ensure the continuous and reliable operation of power systems. Students will gain insights into the coordination of protective relays and the principles of fault discrimination. Furthermore, the module delves into protective relays and their roles in detecting and isolating faults. Students will study various relay types, their operating principles, and the methods used for relay coordination and setting. The protection of transmission lines, alternators, and transformers is given special focus. Students will examine the specific protection schemes employed for these components, addressing fault detection and prevention to maintain system stability and prevent equipment damage. Through theoretical knowledge and practical applications, students will develop the skills necessary to design, analyze, and maintain effective protection systems.			

Module: 44

Code	Course/Module Title	ECTS	Semester
EET4203	Stability of Power Systems	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Stability of Power Systems module focuses on the analysis and assessment of power system stability. Students will explore the fundamentals of symmetrical components and unsymmetrical faults, gaining an understanding of sequence impedances for synchronous machines, transmission lines, and transformers. Sequence networks will be studied to analyze various fault conditions, including single line to ground faults, line to line faults, and double line to ground faults. The module also covers the use of the bus impedance matrix for analyzing unsymmetrical faults and examines the behavior of bus voltages and line currents during fault situations. Students will delve into the stability problem, studying rotor dynamics, the swing equation, and the concept of steady-state and transient stability. The equal-area criterion of stability will be introduced as a practical tool for stability assessment during sudden load changes and three-phase faults. Throughout the module, students will engage in practical applications and problem-solving exercises, developing skills in numerical techniques for solving the swing equation. The module will also emphasize the importance of maintaining power system stability to ensure reliable and secure operation. Assessments may include assignments, simulations, and examinations to evaluate students' understanding and ability to analyze and assess power system stability.			

Module: 45

Code	Course/Module Title	ECTS	Semester
EET4204	High Voltage Techniques	7	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	3	94	81
Description			
The High Voltage Techniques module introduces students to the principles and applications of high voltage systems. It covers various topics related to high voltage generation, measurement, testing, and the phenomena associated with high voltage systems. The module begins with an overview of high voltage generation methods, including DC, AC, and impulse voltages and currents. Students will learn about the principles and techniques involved in generating high voltages for different purposes. Measurement of high voltage and currents is a key aspect of the module, covering techniques for measuring DC, AC, and impulse voltages and currents. Students will also explore the use of cathode ray oscillographs for impulse voltage and current measurements. The module focuses on high voltage testing, including the testing procedures and equipment used for cables, circuit breakers, transformers, and surge arresters. Students will gain practical knowledge of testing techniques and standards to ensure the reliability and safety of high voltage components. The module addresses overvoltage phenomena in electric power systems, such as lightning phenomena, switching surges, and fault systems caused by abnormal conditions. Students will learn about the causes and effects of these phenomena and methods to mitigate their impact. Thermal characteristics and cooling of high voltage cables are also discussed, providing insights into heat transfer and temperature management in underground high voltage systems. The module combines theoretical concepts with practical applications through case studies, simulations, and laboratory experiments. Students will develop a strong foundation in high voltage techniques, enabling them to analyze, design, and troubleshoot high voltage systems in various engineering fields. Assessments in this module may include assignments, laboratory work, and examinations to evaluate students' understanding of high voltage principles and their ability to apply them in real-world scenarios.			

Module: 46

Code	Course/Module Title	ECTS	Semester
EET4205	Project 2	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
0	6	93	32
Description			
Project 2 model stands for Final Year Project Execution and Presentation. This module centers around the execution and completion of the final year project. Students will implement their proposed methodology, conduct experiments or research activities, collect and analyze data, and draw meaningful conclusions. They will document their project progress and findings in a comprehensive final report. Additionally, students will prepare a presentation or demonstration to showcase their project outcomes, allowing them to effectively communicate their work to a wider audience. This module aims to foster critical thinking, problem-solving, and presentation skills, while encouraging students to apply their knowledge in a practical and independent manner.			

Module: 47

Code	Course/Module Title	ECTS	Semester
EET3206	Communication Systems	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Principles of Communication Systems module provides a comprehensive understanding of data communications, networking, and transmission principles. Students will explore various modulation techniques and their applications in both analog and digital systems. Topics covered include the fundamentals of data transmission, different transmission media, and the characteristics of amplitude modulation (AM), phase modulation (PM), and frequency modulation (FM) systems. Students will also learn about sampling techniques, pulse amplitude modulation (PAM), pulse width modulation (PWM), pulse position modulation (PPM), and pulse code modulation (PCM). Digital modulation techniques, including amplitude shift keying (ASK), frequency shift keying (FSK), and phase shift keying (PSK), will be studied in detail. The module also covers the analysis of noise in both analog and digital communication systems, as well as an introduction to spread spectrum techniques. Additionally, the module includes a study of antennas and their role in communication systems. Students will gain knowledge about antenna principles, types, and their applications in wireless communication. Through theoretical concepts and practical applications, students will develop a strong foundation in communication systems and their underlying principles, enabling them to design and analyze various communication networks and systems.			

Module: 48

Code	Course/Module Title	ECTS	Semester
EET3207	Digital Signal Processing	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
Digital Signal Processing (DSP) is a module that delves into the principles and techniques used for processing digital signals. The module covers a range of topics aimed at providing students with a comprehensive understanding of DSP fundamentals and their applications. The module begins by introducing the basic concepts of signals and systems, emphasizing the importance of signal representation and the role of systems in signal processing. Students will explore convolution, correlation, and the analysis of sampled data systems, which are essential tools in DSP. Fourier series and Fourier transform are key topics covered in the module, enabling students to analyze the frequency content of signals and understand their spectral properties. The discrete Fourier transform (DFT) and the fast Fourier transform (FFT) algorithms are introduced as efficient methods for computing the Fourier transform of discrete signals. The module also introduces the Z-transform, a valuable tool for analyzing discrete-time systems. Students will learn about its properties and applications in areas such as filter design and system analysis. Digital filter realization is another focal point of the module, where students will study different techniques for implementing digital filters, including finite impulse response (FIR) and infinite impulse response (IIR) filter structures.			

Module: 49

Code	Course/Module Title	ECTS	Semester
EET4206	Modeling and Simulation	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Modeling and Simulation module focuses on equipping students with the knowledge and skills to effectively model and simulate electrical systems. The module covers various aspects of modeling, starting with separately excited, shunt connected, and series connected DC motors, along with the incorporation of PID controllers. Students also learn about the modeling of single-phase two-winding and three-winding transformers. The module delves into simulation exercises that involve power analysis in single-phase circuits, power factor correction, and the modeling and simulation of transmission lines. By engaging in these simulations, students gain practical experience in analyzing and evaluating electrical systems' behavior and performance. They also learn to interpret simulation results and make informed decisions based on the findings. Through this module, students develop a strong foundation in modeling and simulation techniques, which are essential for various engineering applications. They gain a deeper understanding of the behavior and characteristics of electrical systems, enabling them to design and optimize systems, troubleshoot issues, and make informed engineering decisions. Overall, the Modeling and Simulation module provides students with the necessary tools to excel in the field of electrical engineering.			

Module: 50

Code	Course/Module Title	ECTS	Semester
EET4207	Advance Control Systems	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Advanced Control Systems module explores advanced techniques and concepts used in control systems analysis and design. The module begins with frequency domain analysis, covering topics such as gain margin and phase margin, which provide insights into system stability and robustness. Students learn to construct Bode plots and analyze system responses in the frequency domain. The module introduces compensator networks, including lead, lag, and lead-lag networks, which are used to improve system performance and stability. Students learn about the design and implementation of these compensators to achieve desired system responses. Additionally, the module covers the design and tuning of PID controllers, which are widely used in various control applications. Different tuning methods, such as trial and error and the Ziegler-Nichols method, are discussed to optimize controller performance. By studying advanced control techniques, students gain a deeper understanding of control system analysis and design. They develop skills to analyze and optimize control systems in the frequency domain and effectively apply compensator networks and PID controllers to achieve desired system behavior. The module equips students with the knowledge and tools necessary to design robust and efficient control systems for a wide range of applications.			

Module: 51

Code	Course/Module Title	ECTS	Semester
EET4208	Sustainable Energy	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
The Sustainable Energy module explores various renewable and sustainable energy sources and their practical applications. It begins with an introduction to different energy forms, including solar energy, bioenergy, geothermal energy, hydrogen, hydropower, marine energy, wind energy, algae fuels, earth infrared thermal radiation, and crop wastes energy. The module focuses on solar energy and covers important concepts such as astronomical equations for solar angles, sunrise and sunset times, and day length. It also discusses solar tracker systems, photovoltaic (PV) panel modeling, and different types of PV panels and batteries. In addition, the module addresses solar PV power supply systems, including standalone (off-grid), connected (on-grid), and hybrid systems. It explores maximum power point tracking (MPPT) techniques for optimizing PV system performance. The practical aspects of PV system installation, array reconfiguration under shading conditions, and factors affecting system performance are discussed. Design considerations, such as multilevel inverters and parallel inverters, are also covered. Overall, this module provides students with a comprehensive understanding of sustainable energy sources and their integration into practical applications. Students gain knowledge and skills to design and optimize solar PV systems, analyze system performance factors, and contribute to the development of sustainable energy solutions.			

Module: 52

Code	Course/Module Title	ECTS	Semester
EET4209	Industrial Management	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	2	79	46
Description			
Industrial Management is a module that covers the principles and practices of managing industrial organizations effectively. It includes topics such as organizational structure and design, leadership and motivation, strategic management, operations and production management, human resource management, financial management, and ethical and social responsibility. Students will learn about different organizational structures, leadership styles, and motivational techniques. They will also study strategic planning, operations management, quality control, supply chain management, and financial analysis. The module emphasizes the importance of ethical conduct and social responsibility in industrial settings. Overall, it provides students with the knowledge and skills necessary to manage industrial organizations efficiently, make strategic decisions, optimize operations, and promote a sustainable and ethical business environment.			