# Modules Catalogue |2025-2026|

## University of Samarra

***First Cycle — Bachelor degree (B.Sc.) – Electromechanical Engineering***


**Table of Contents**

# 1. Overview

This catalogue is about the courses (modules) given by the program of Electromechanical Engineering to gain the Bachelor of Science degree. The program delivers (**46**) Modules with (**6000**) total student workload hours and **240** total ECTS. The module delivery is based on the Bologna Process.

# 1. Undergraduate Modules 2025-2026

## Module 1

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME111 | Thermodynamics | 9 | 1 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 1/2/3 | 138 | 87 |
| **Description** | | | |
| The curriculum aims to provide students with a deep understanding of the principles of thermodynamics, their practical applications in various engineering fields, and the ability to analyze and solve thermodynamic problems. Students learn to apply these concepts to realworld scenarios, such as energy conversion processes and environmental applications The subject of thermodynamics typically covers the following key topics : Basic Concepts :Definition of heat, temperature, and energy. Types of thermodynamic systems: open, closed, and isolated systems. Pressure, volume, and temperature relationships. Laws of Thermodynamics: The first law of thermodynamics (Conservation of Energy) and its applications . The second law of thermodynamics and concepts of heat engines and efficiency . Entropy and the third law of thermodynamics . Properties of Pure Substances :Phase diagrams and phase transitions (solid-liquid-gas). Thermodynamic properties of substances: specific heat, enthalpy, and internal energy . Work and Heat Transfer: Work done by a system and its types (expansion, compression) . Heat transfer mechanisms: conduction, convection, and radiation. Thermodynamic Processes :Isothermal, adiabatic, isochoric, and isobaric processes . Reversible and irreversible processes. Thermodynamic Cycles: Carnot cycle and its efficiency . Real thermodynamic cycles like Rankine and Brayton cycles. Applications :Refrigeration and air conditioning systems. Power generation systems: steam power plants, gas power plants. | | | |

## Module 2

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME112 | Mathematics | 9 | 1 |
| **Class** | **Lec/ /Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 4 | 1/3 | 123 | 102 |

| Description |
|---|
| In Mathematics, the students will study functions and they will learn how to link dependent and independent variables together, drawing curves and studying the behavior of the functions , then Trigonometric functions are reviewed. Limits and Continuity are given to describe the way a function varies. The derivative is one of the key ideas in calculus, and the students will learn how to use it to solve a wide range of problems involving tangents and rates of change. Also, using derivatives to find extreme values of functions are covered, to determine and analyze the shapes of graphs, and to find numerically where a function equals zero. Later, Integrals and its applications are studied. Transcendental functions , including inverse functions, logarithms, exponential functions, and hyperbolic functions are studied in details. Students also will recognize numerical integration and study techniques of integration. A useful tool for describing motion, like that of planets and satellites or projectiles moving in the plane or space, are introduced using polar coordinates rather than the rectangular or Cartesian system. The curriculum also covers the matrix topic. |

## Module 3

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME113 | Computer Science | 4 | 1 |
| **Class** | **Lab./ Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 1 | 2/1 | 63 | 37 |

| Description |
|---|
| The computer curriculum usually covers the main topics, the development of the computer since its invention in 1946 and the relationship of this development to the different generations of computers depends largely on the technology of electronic materials used in the internal parts as well as the physical components of the computer with an explanation of the role and tasks of each part and secure components that include the programs necessary to operate the computer, including the operating system and machine language in addition to high-level application programming languages as well as methods of storing information on the hard disk and RAM and random access memory (RAM) and read-only memory (ROM) in addition to the main tasks of the motherboard with the appropriate qualification in addition to secure information with computer work partners, while the practical side is learning high skills in difficult tasks, namely Word, Excel, Access and PowerPoint, with a focus on implementing specialized programs. |

## Module 4

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME114 | Engineering Physics | 5 | 1 |
| **Class** | **Lec/ Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |

| | | | |
|---|---|---|---|
| 2 | 1/2 | 78 | 47 |

| Description |
|---|
| The course provides general information about physics, which includes the atomic structure with groups of elements of the periodic table and the type of bonds in solid materials. It also includes the crystal structure of solid materials to classify ferrous and non-ferrous metals to produce the structure of alloys and their classification and types according to the mechanical properties of strength, hardness, toughness, brittleness, ductility, malleability, flexibility, plasticity, hardness, stress that affects them such as compressive strength, tensile strength, as well as heat treatments that produce annealing, normalization, and hardening, all using these properties in engineering calculations to produce various industrial materials. |

## Module 5

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME115 | Mechanical Workshop | 3 | 1 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 1 | 2 | 48 | 27 |

| Description |
|---|
| An overview of mechanical engineering and its applications with an introduction to basic mechanical concepts and principles and the role of mechanical engineering in various industries, as well as various hand tools and equipment and their uses in mechanical engineering with familiarity with electrical tools such as drills, mills, saws and an overview of specialized equipment, such as welding machines, CNC machines and others, as well as identifying measuring equipment and gauges and methods of using measuring tools such as calipers and micrometers and accurate measurement and calibration techniques, as well as assembling and disassembling mechanical components while taking into account industrial safety in proper handling and alignment of components during assembly, as well as identifying basic concepts in welding with a description and uses of gas and arc welding methods with a coated electrode, with emphasis on students practicing applications in a practical manner and taking industrial safety instructions during work. |

## Module 6

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME121 | Fundamentals of Electrical Engineering | 9 | 2 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 1/2/2 | 123 | 102 |
| **Description** | | | |
| This course provides an essential introduction to the principles, theories, and practical applications of electrical engineering. It is designed to build a strong foundation in understanding electrical systems and their components, preparing students for advanced studies and real-world engineering challenges | | | |

## Module 7

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME122 | Engineering Mechanics | 8 | 2 |
| **Class** | **Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2/2 | 108 | 92 |
| **Description** | | | |
| This course introduces the fundamental principles of mechanics, focusing on the analysis of forces and their effects on structures and motion. This course is essential for understanding and designing mechanical and structural systems in engineering disciplines such as civil, mechanical, and aerospace engineering. | | | |

## Module 8

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME123 | Engineering Drawing and Auto CAD | 6 | 2 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |

| | | | |
|---|---|---|---|
| 3 | 3 | 93 | 57 |
| **Description** | | | |
| This course combines fundamental principles of engineering drawing with practical training in AutoCAD software, equipping students with the skills to create accurate and professional technical drawings. It emphasizes both manual drafting techniques and computer-aided design (CAD) to meet industry standards. | | | |

## Module 9

| **Code** | **Module Title** | **ECTS** | **Semester** |
|---|---|---|---|
| EME124 | Electric Workshop | 4 | 2 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 1 | 3 | 63 | 37 |
| **Description** | | | |
| Electric Workshop course typically focuses on practical skills and foundational knowledge related to electrical systems and components. The Electric Workshop course is designed to provide hands-on training and theoretical knowledge in electrical engineering and technology. Participants will gain practical experience with tools, materials, and techniques essential for working with electrical systems | | | |

## Module 10

| **Code** | **Module Title** | **ECTS** | **Semester** |
|---|---|---|---|
| EME125 | English Language I | 3 | 2 |
| **Class** | **Sem.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | 1 | 48 | 27 |
| **Description** | | | |
| These courses will improve the ability of the students to understand, speak, read and write English as a second language with some technical texts. It is also intended to teach them, how to use technical English effectively as a language of instruction, Lab. Experiments and Exercises, examples, using Technical Terminologies as close as possible to the lectures they receive during their study. In addition to teach them how to give academic presentation, and how to write academically. | | | |

## Module 11

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME211 | Electronics | 8 | 3 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 1/2/1 | 108 | 92 |

### Description

**Electronics** is a fundamental course for engineering students, particularly those specializing in electrical, electronic, or mechatronics engineering. The course introduces students to the essential principles of electronic components and circuits, including diodes, transistors (BJT and MOSFET), and operational amplifiers. It covers both analog and basic digital electronics, providing students with the analytical and practical skills required to design, build, and test electronic systems. Through a combination of theoretical instruction and hands-on lab work, students learn how to use measurement tools, circuit simulation software, and prototyping techniques. The course serves as a foundation for more advanced topics such as control systems, embedded systems, and communication technologies, making it crucial for developing problem-solving skills and engineering intuition.

## Module 12

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME212 | Fluid Mechanics | 8 | 3 |
| **Class** | **Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2/2 | 108 | 92 |

### Description

**Fluid Mechanics** is a core course in engineering that focuses on the behavior of fluids (liquids and gases) at rest and in motion. It provides students with a deep understanding of fundamental principles such as pressure, buoyancy, fluid flow, continuity, momentum, and energy conservation. The course equips students with the ability to analyze and solve real-world problems involving fluid systems, such as pipe flows, open channel flows, and air flow over surfaces. It combines theoretical knowledge with practical applications across various engineering fields, including mechanical, civil, aerospace, and environmental engineering. Laboratory experiments and computational tools are often used to enhance understanding and demonstrate fluid behavior under different conditions.

## Module 13

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME213 | Strength of Materials | 5 | 3 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2 | 78 | 47 |

**Description**

**Strength of Materials**, also known as Mechanics of Materials, is a fundamental engineering course that focuses on the behavior of solid objects under various types of loading. Students learn how materials respond to forces such as tension, compression, shear, bending, and torsion. The course covers essential topics like stress, strain, elasticity, axial loading, beam theory, torsional analysis, and deformation. It provides the analytical tools needed to determine whether a material or structural component can withstand applied loads without failure. This knowledge is critical for the safe and efficient design of mechanical structures, buildings, bridges, machines, and other engineering systems. Both theoretical concepts and problem-solving techniques are emphasized, often supported by laboratory experiments and simulations.

## Module 14

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME214 | C++ Language | 4 | 3 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 1 | 2 | 48 | 52 |

**Description**

**C++ Language** is an essential programming course designed to introduce engineering students to structured and object-oriented programming concepts. The course focuses on the syntax, semantics, and practical applications of the C++ programming language, covering topics such as variables, control structures, functions, arrays, pointers, classes, inheritance, and polymorphism. Students learn how to write efficient, modular, and reusable code to solve computational and engineering problems. The course often includes hands-on programming assignments and projects that develop logical thinking and problem-solving skills. Understanding C++ is particularly valuable for students interested in embedded systems, simulation, robotics, and software development, as it forms the foundation for more advanced programming and system design courses.

## Module 15

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME215 | English Language II | 3 | 3 |
| **Class** | **Semn.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | 1 | 48 | 27 |

### Description

**English Language** is a vital course for engineering students, aimed at enhancing their communication skills in both academic and professional contexts. The course focuses on developing students' abilities in reading, writing, listening, and speaking, with particular emphasis on technical and scientific vocabulary relevant to engineering fields. It also covers academic writing, report preparation, oral presentations, and effective communication in collaborative environments. By improving their command of English, students are better equipped to engage with international research, documentation, and professional discourse, making the course essential for future careers in a global engineering environment.

## Module 16

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME216 | Crimes of Al Baath Regime in Iraq | 2 | 3 |
| **Class** | **Lec/Lab./Prac./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | - | 33 | 17 |

### Description

**Crimes of the Ba'ath Regime in Iraq** refer to a series of systematic human rights violations, political repression, and acts of violence committed during the rule of the Ba'ath Party, particularly under Saddam Hussein's leadership (1979–2003). These crimes include mass executions, forced disappearances, torture, ethnic cleansing, and the use of chemical weapons. Notable atrocities include the **Anfal Campaign** against the Kurds in the late 1980s, which resulted in the deaths of tens of thousands; the **Halabja chemical attack** in 1988; and the brutal suppression of the **1991 Shi'a and Kurdish uprisings**. The regime also targeted political opponents, intellectuals, and minority communities, creating a climate of fear and oppression. These acts have been widely condemned by international human rights organizations and are considered crimes against humanity and, in some cases, acts of genocide.

## Module 17

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME221 | Electric Circuits | 8 | 4 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 1/2/2 | 123 | 77 |

**Description**

**Electric Circuits** is a foundational course in engineering that introduces students to the principles and analysis of electrical circuits. The course covers essential topics such as Ohm's Law, Kirchhoff's laws, series and parallel circuits, node and mesh analysis, Thevenin's and Norton's theorems, as well as transient and steady-state analysis of AC and DC circuits. Through both theoretical instruction and hands-on lab work, students learn to analyze and design basic electrical networks used in a wide range of engineering applications. This course builds a strong foundation for more advanced studies in electronics, power systems, control systems, and embedded systems. It also enhances problem-solving skills and promotes a deeper understanding of how electrical energy is generated, transmitted, and utilized.

## Module 18

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME222 | Theory of Machines | 7 | 4 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2 | 78 | 97 |

**Description**

**Theory of Machines** is a core mechanical engineering course that focuses on the analysis of mechanisms and the principles governing the motion of machines. The course explores the kinematics and dynamics of mechanical systems, including linkages, gears, cams, flywheels, and governors. Students learn how to analyze motion, velocity, acceleration, and force transmission within various machine components. Topics such as balancing of rotating masses, gyroscopic effects, and vibration analysis are also covered. The course provides the theoretical foundation for the design and optimization of mechanical systems, enhancing students' understanding of how machines function and interact. It is essential for students pursuing careers in mechanical design, robotics, automotive engineering, and industrial automation.

## Module 19

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME223 | Engineering Mathematics | 6 | 4 |
| **Class** | **Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 3 | 93 | 57 |

### Description

**Engineering Mathematics** is a fundamental course that provides the mathematical tools and techniques essential for solving complex engineering problems. It covers a wide range of topics including calculus, differential equations, linear algebra, complex numbers, vector analysis, Laplace and Fourier transforms, and numerical methods. The course emphasizes both theoretical understanding and practical application, enabling students to model, analyze, and interpret physical systems across various engineering disciplines. Engineering Mathematics develops critical thinking, logical reasoning, and problem-solving skills, forming the backbone for advanced studies in fields such as control systems, fluid dynamics, signal processing, and structural analysis.

## Module 20

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME224 | Programming (MATLAB) | 4 | 4 |
| **Class** | **Lab.** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 1 | 2 | 48 | 52 |

### Description

**Programming (MATLAB)** is a practical and application-focused course designed to introduce engineering students to computational problem-solving using MATLAB, a high-level programming environment widely used in engineering and scientific research. The course covers the fundamentals of programming, including variables, data types, control structures, functions, and visualization techniques. Students also learn how to perform numerical computations, matrix operations, data analysis, and graphical representations. Emphasis is placed on applying MATLAB tools to solve real-world engineering problems in areas such as signal processing, system modeling, control, and simulation. The course enhances algorithmic thinking and equips students with essential skills for advanced engineering courses and research projects.

## Module 21

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME225 | Arabic Language | 3 | 4 |
| **Class** | **Lec/Lab./Prac./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | - | 33 | 42 |

**Description**

**Arabic Language** is a vital course aimed at strengthening students' proficiency in their native language, with a focus on academic and professional communication. The course develops skills in reading, writing, speaking, and grammar, while emphasizing clarity, accuracy, and coherence in technical and formal contexts. Students learn how to construct well-organized reports, conduct effective presentations, and engage in written and oral communication relevant to their field of study. Special attention is given to scientific and engineering terminology in Arabic, enhancing students' ability to articulate complex ideas in both academic and workplace settings. This course fosters linguistic confidence and cultural awareness, supporting students' success in both local and regional professional environments.

## Module 22

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME226 | Human Rights and Democracy | 2 | 4 |
| **Class** | **Lec/Lab./Prac./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | - | 33 | 17 |

**Description**

**Human Rights and Democracy** is a multidisciplinary course that introduces students to the fundamental principles of human dignity, freedom, equality, and democratic governance. The course explores the historical development, legal frameworks, and philosophical foundations of human rights, as well as the essential elements of democratic systems, including rule of law, separation of powers, and citizen participation. Students examine global and regional human rights instruments, such as the Universal Declaration of Human Rights, and analyze contemporary issues like freedom of expression, minority rights, gender equality, and social justice. The course fosters critical thinking, ethical awareness, and civic responsibility, preparing students to contribute positively to society and uphold democratic values in both their personal and professional lives.

## Module 23

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME311 | Heat Transfer | 5 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 5 | 3/1/1 | 78 | 47 |

**Description**

"The curriculum aims to provide students with a solid understanding of the fundamental principles of heat transfer and its various mechanisms, enabling them to analyze and design thermal systems in diverse engineering applications. The course also seeks to introduce students to the phenomena of thermal conduction, convection, and radiation, and their role in transferring thermal energy across different materials and media, while clarifying the governing mathematical relationships for each mechanism. Furthermore, the course focuses on developing students' ability to solve engineering problems related to thermal distribution in solids and fluids, and calculating heat transfer rates in various systems. It also illustrates the applications of heat transfer in heat exchangers, thermal insulation, refrigeration, and air conditioning. In addition, the course works on enhancing students' ability to use differential equations and numerical methods in analyzing complex heat transfer problems, and developing their skills in critical thinking, engineering analysis, and problem-solving in the field of thermal systems design. This contributes to preparing them scientifically and professionally for work in the fields of energy and industry, meeting future requirements."

## Module 24

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME312 | Electrical Machines (DC & AC) | 6 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 6 | 3/2/1 | 93 | 57 |

**Description**

"This model aims to introduce the fundamental principles of electromechanical energy conversion, understand the construction, operating principles, and characteristics of DC machines (motors and generators), analyze single-phase and three-phase transformers, their equivalent circuits, and efficiency, study AC machines, including synchronous machines and induction motors, provide knowledge on performance analysis, testing, and applications of electrical machines in real systems, and finally prepare students for practical laboratory work to reinforce theoretical understanding."

## Module 25

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME313 | Vibrations | 4 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 4 | 2/1/1 | 63 | 37 |

**Description**

"This course aims to explain the vibration science through the application of techniques, and understand fundamental concepts of vibration (natural frequency, wave amplitude, resonance phenomena, etc.), as well as finding equivalent basic properties of vibrating systems such as stiffness, mass, and damping, etc. It also aims to understand free vibration, explain the equation of motion and natural frequency of a vibrating system, with the application of Newton's second law of dynamics in vibration systems. Furthermore, the course seeks to explain free vibration in translational, rotational, and torsional motion, study free vibration with damping, and understand forced vibration in two cases (undamped and damped), leading up to the study of two-degree-of-freedom systems."

## Module 26

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME314 | Air Conditioning | 4 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2/0/1 | 48 | 52 |

**Description**

"This course aims to understand the fundamental principles of air conditioning, identify concepts of humidity and air mixing, calculate heating and cooling loads, and analyze thermal comfort systems. It also includes the design of air ducts and air distribution, determining pressure drop and fan selection, leading up to applying theoretical knowledge in the lab using measurement tools, and analyzing real-life systems in buildings."

## Module 27

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME315 | Engineering Analysis | 3 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2/0/1 | 48 | 27 |

**Description**

"This course aims to understand complex functions and their solution methods. Through it, the student learns the types of differential equations: ordinary and partial, and how to solve problems related to electromechanical engineering applications using these equations. It also includes describing and understanding the Laplace transform and its use in solving differential equations, describing and understanding Fourier series, leading up to enabling the student to choose the optimal method for solving problems in the field of electromechanical engineering."

## Module 28

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME316 | Analog Communications | 4 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 4 | 2/1/1 | 63 | 37 |

**Description**

"This course aims to familiarize with the functional elements of a communication system, study the basics of communication engineering systems, and learn about the communication model and its components. It also seeks to develop a comprehensive understanding of signal analysis techniques, including the use of Fourier series and Fourier transforms, to classify and interpret both periodic and non-periodic signals effectively. Furthermore, the course aims to gain a thorough understanding of various modulation techniques, specifically Amplitude Modulation (AM) and Angle Modulation (FM and PM), including the design, operation, and performance analysis of corresponding transmitters and receivers, leading up to analyzing and classifying systems based on their characteristics, utilizing concepts such as power spectral density and correlations to evaluate the performance and efficiency of different communication systems."

## Module 29

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME317 | Fluid Machinery | 4 | 5 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 4 | 2/1/1 | 63 | 37 |

**Description**

"This course includes the application of similarity laws in fluid machinery, analysis of water flow in an impulse turbine, as well as identifying the functions of reaction turbine components, flow analysis according to its types, and performance evaluation. It also includes the study of cavitation phenomenon in reaction turbines and methods of prevention, describing centrifugal pump components and analysis of internal flow, with the detection of cavitation in pumps, its causes, and methods of prevention. Furthermore, the course covers the study of gas turbine performance and analysis of gas flow through the blades, leading up to the analysis of gas flow in a centrifugal compressor and calculating its efficiency."

## Module 30

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME321 | Digital Communications | 5 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 4 | 2/1/1 | 63 | 62 |

**Description**

"This course aims to understand pulse modulation techniques including PAM, PWM, and PPM, with a focus on pulse shaping and signal-to-noise (S/N) performance in analog PAM systems. It also includes the analysis and implementation of time division multiplexing (TDM) and exploring its applications in communication systems, and gaining a comprehensive understanding of digital modulation techniques including ASK, PSK, FSK, and M-ary modulation, and evaluating their performance in noisy environments. Furthermore, the course covers the study of quantization in PCM systems, and examining different signaling formats such as unipolar, bipolar, and split-phase Manchester encoding, in addition to analyzing noise effects on digital modulation schemes and calculating error probabilities using coherent and non-coherent detection methods, leading up to strengthening theoretical knowledge through practical implementation of scientific experiments."

## Module 31

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME322 | Numerical Analysis | 4 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 3 | 2/0/1 | 48 | 52 |

**Description**

"This course aims to introduce numerical methods, their analysis, and their implementation to solve a wide range of engineering problems, including non-linear equations, numerical integration, interpolation, and differential equations. It also addresses various computational techniques, their applicability, accuracy, and associated error analysis. Special attention is given to programming these methods and applying them using modern computers. By integrating theoretical principles with practical applications in electromechanical engineering, the module contributes to developing students' computational skills and enhancing their understanding of numerical techniques used in modern engineering software packages."

## Module 32

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME323 | English Language III | 2 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | 2/0/0 | 33 | 17 |

**Description**

"This course aims to develop foundational language skills for students in reading, writing, listening, and speaking. The course focuses on improving the ability to understand and use English in academic, professional, and daily contexts. By learning grammar, vocabulary, and linguistic styles, the student becomes capable of expressing themselves effectively and clearly in various situations."

## Module 33

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME324 | Instruments and Measurements | 2 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 2 | 2/0/0 | 33 | 17 |

**Description**

"This course aims to provide students with essential concepts in electrical measuring instruments, focusing on types of instruments, their operating principles, and their use in engineering applications. It also seeks to develop students' skills in performing and interpreting electrical measurements accurately and analyzing associated errors."

## Module 34

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME325 | Combustion | 5 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 4 | 2/1/1 | 63 | 62 |

**Description**

"This course aims to understand the fundamental principles of combustion, including chemical reactions, thermodynamics, and heat release, and analyzing combustion processes in various systems such as engines, turbines, and industrial furnaces. It also includes identifying the factors affecting flame stability, ignition, and combustion efficiency, and evaluating different fuel types and their combustion characteristics. Furthermore, the course seeks to evaluate pollutant formation mechanisms and emission reduction strategies, leading up to applying combustion theories to design and optimize practical combustion systems."

## Module 35

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME326 | Power and Protection Systems | 6 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 5 | 3/1(OL)/1 | 78 | 72 |

**Description**

"This course aims to provide students with a solid understanding of the fundamental principles of electrical power systems and their main components, including generation, transmission, distribution, and electrical loads, enabling them to analyze the performance of power systems under various operating conditions. The course also seeks to introduce students to electrical protection concepts and their importance in ensuring the continuity of electrical supply, increasing system reliability, and minimizing faults and associated risks. It focuses on the study of fault types in power systems, their analysis methods, and mechanisms for selecting and coordinating protection devices such as circuit breakers, relays, and fuses, ensuring the rapid and efficient isolation of the faulty part of the network while maintaining the stability of the rest of the system. The course also illustrates the principles of protecting generators, transformers, transmission lines, and distribution networks, alongside studying short circuits, power flow, stability, and preventive coordination. Additionally, it aims to develop students' ability to conduct engineering analysis of power and protection systems, evaluate the performance of their components, and propose appropriate solutions to operational and technical problems. This contributes to developing their skills in critical thinking, problem-solving, and making engineering decisions related to the design, operation, and protection of electrical systems, preparing students scientifically and professionally to work in fields of electrical power generation, transmission, and distribution, power plants, and protection networks, in line with modern engineering application requirements."

### Module 36

The following table:

| Code | Module Title | ECTS | Semester |
|---|---|---|---|
| EME327 | Microcontrollers | 6 | 6 |
| **Class** | **Lec/Lab./Tutor** | **SSWL (hr/sem)** | **USSWL (hr/sem)** |
| 5 | 2/2/1 | 78 | 72 |

**Description**

"This course aims to study fundamentals of microprocessor systems, deal with interfacing of different peripheral devices with Microprocessors, and understand the fundamental concepts of Control systems and mathematical modeling of physical systems. It also includes analyzing the time response of LTI systems, analyzing LTI systems using frequency response, and developing and analyzing State Variables of the system. Furthermore, the course covers the study of fundamentals of microcontroller systems with Assembly Language Programming, understanding microcontroller C Language Programming concepts, and knowing the importance of different peripheral devices and their interfacing to microcontrollers, leading up to getting familiar with RISC Architecture."

## 8. Contact

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