

Modules Cataluge |2024-2025|

University of Samarra



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



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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 2024-2025

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

Module 15

Code	Module Title	ECTS	Semester
EME215	English Language	3	3
Class	Semn.	SSWL (hr/sem)	USSWL (hr/sem)
2	1	48	27
Description			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

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			
<p>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.</p>			

8. Contact

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