
Republic of Iraq
Ministry of Higher Education &
Scientific Research
Alayen Iraqi University AUIQ
Engineering College
Department of Artificial Intelligent
Engineering



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة العين العراقية
كلية الهندسة
قسم هندسة الليزر والالكترونيات البصرية

دليل المواد الدراسية | 2024-2025 | Program Catalogue

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

Laser and optoelectronics engineering

بكالوريوس – هندسة الليزر والالكترونيات البصرية



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1. Overview

This catalogue presents the courses (modules) offered by the Laser and optoelectronics Engineering Program leading to the Bachelor of Science degree. The program delivers 60 modules, with a total student workload of 7500 hours and 240 ECTS credits. The module delivery follows the Bologna Process.

نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الليزر والالكترونيات البصرية للحصول على درجة بكالوريوس هندسة. يقدم البرنامج (60) مادة دراسية، مع (7500) ساعة حمل دراسي إجمالية للطالب و (240) وحدة (ECTS) ويعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
MATH110	Mathematics	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	87
Description			
Further Techniques in Integration, Integration by Parts, Tabular Integration, Trigonometric Integrations, Integration by Trigonometric Substitutions, Integration by $Z=\tan(x/2)$ Substitutions, Partial Fractions Integration, Improper Integrals, Convergence and Divergence Theorem, Sequences of Numbers, Limit of Sequences, Infinite Series, Definition and			

Properties, Partial Sums test, Geometric Series, Nth. Term test,

Alternating Series, Ratio test, Root test, Comparison test, Integral test, Harmonic Series, P-Series, Power Series, Taylor's Theorem, Maclaurin's Series, Intervals of Convergence, Matrices and Determinants, Definition of Matrix, Properties, Special Matrices, Matrix Algebra, Definition of Determinant, Properties, Cofactors and Cominors, Evaluation of determinants, Inverse of Matrix, Applications, Cramer's Rule.

Module 2

Code	Course/Module Title	ECTS	Semester
LAER111	Laser Sciences	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
This module offers a comprehensive introduction to the fundamental principles and applications of laser technology. Students will explore the physics of laser operation, including stimulated emission, population inversion, and optical amplification. Key concepts such as types of lasers (gas, solid-state, semiconductor, and fiber lasers), laser components, beam properties, and safety protocols are thoroughly discussed. The course emphasizes both theoretical understanding and practical applications, highlighting the role of lasers in fields such as medicine, communication, manufacturing, defense, and scientific research. Through demonstrations and case studies, students will examine how lasers are used in surgeries, barcode scanners, LIDAR systems, and optical data transmission. Attention is also given to laser safety, efficiency, and system design. By the end of the module, students will gain foundational knowledge of laser systems and their integration into modern technologies, preparing them for more advanced studies in photonics, optics, and applied physics.			

Module 3

Code	Course/Module Title	ECTS	Semester
URCOM	Computer Fundamentals and Programing	3	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
This module equips students with essential computer literacy and practical skills necessary for academic and professional success in engineering and technology fields. It introduces the fundamentals of computer hardware and software, operating systems (Windows and Linux), file management, and internet navigation. Students will gain hands-on experience with			

productivity tools such as word processors, spreadsheets, and presentation software. The module also covers the basics of programming, introducing logical thinking and problem-solving through beginner-friendly languages such as Python or Scratch. Additionally, students will explore safe and responsible use of technology, including data security, digital communication, and basic troubleshooting techniques. Emphasis is placed on developing the ability to use digital tools efficiently in academic tasks, technical documentation, and collaborative projects. By the end of the course, students will possess a strong foundation in computer usage that supports further study in more advanced computing and engineering modules.

Module 4

Code	Course/Module Title	ECTS	Semester
DRAW110	Engineering Drawing	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	108	67
Description			
This module introduces the fundamental principles of engineering drawing as a universal language of engineers and designers. It covers the basics of technical drawing, including geometric constructions, orthographic projections, isometric views, section views, and dimensioning techniques. Students will learn to interpret and create accurate two-dimensional (2D) and three-dimensional (3D) drawings using both traditional drawing tools and modern computer-aided design (CAD) software. Emphasis is placed on developing spatial visualization skills, attention to detail, and adherence to engineering drawing standards (such as ISO and ANSI). The course also includes practice in reading and producing mechanical components, assembly drawings, and schematic diagrams. Through hands-on exercises and projects, students will gain the ability to communicate technical ideas clearly and effectively. This module serves as a critical foundation for courses in design, manufacturing, and mechanical systems within engineering disciplines.			

Module 5

Code	Course/Module Title	ECTS	Semester
PHYS111	Physics	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
This introductory module provides students with a solid foundation in the fundamental			

principles of physics, essential for understanding the physical world and its technological applications. The course covers core topics such as mechanics (motion, forces, energy, and momentum), thermodynamics, waves, sound, light, and basic electricity and magnetism. Emphasis is placed on developing problem-solving skills and applying mathematical methods to analyze physical systems. Students will learn to use scientific reasoning and experimental techniques through lectures, hands-on laboratory experiments, and practical demonstrations. The module also introduces key concepts in modern physics, including atomic and nuclear physics, relevant to emerging technologies and innovations. By integrating theory with practice, students gain a deeper appreciation of how physics principles support engineering, artificial intelligence, and other scientific disciplines. This course prepares students for more advanced studies in electronics, robotics, optics, and other technology-driven fields.

Module 6

Code	Course/Module Title	ECTS	Semester
LAER110	Electrical Circuits DC	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	32
Description			
This module introduces students to the fundamental concepts and analysis techniques of electrical circuits. It covers essential topics such as voltage, current, resistance, power, energy, and the application of Ohm's Law and Kirchhoff's Laws in circuit analysis. Students will learn to analyze series, parallel, and combination resistor networks, as well as capacitive and inductive circuits under both direct current (DC). The module also introduces the use of basic circuit theorems (Thevenin's and Norton's), transient analysis, and the behavior of RL, RC, and RLC circuits. Practical lab sessions complement the theoretical knowledge, allowing students to build and test circuits using electronic components and measurement instruments such as multimeters and oscilloscopes. This module lays a critical foundation for understanding more advanced topics in electronics and electrical engineering, essential for students in AI, robotics, and engineering-related disciplines.			

Module 7

Code	Course/Module Title	ECTS	Semester
URDEM	Democracy and Human Rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			

This module provides students with a foundational understanding of democratic systems and the principles of human rights. It explores the historical development, core values, and functioning of democracy, including the rule of law, political participation, separation of powers, and free elections. The module also examines the concept of human rights, their origins, classifications (civil, political, economic, social, and cultural rights), and international frameworks such as the Universal Declaration of Human Rights. Students will analyze the role of institutions, civil society, and global organizations in promoting and protecting human rights. Through discussions, case studies, and reflective activities, learners will gain awareness of issues like freedom of expression, gender equality, minority rights, and the challenges to democracy in modern societies. This course aims to foster critical thinking, civic responsibility, and a deep appreciation for the values of justice, equality, and human dignity.

Module 8

Code	Course/Module Title	ECTS	Semester
URARA	Arabic Language	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
This module aims to strengthen students' proficiency in Modern Standard Arabic, focusing on both linguistic and communicative skills. It covers key aspects of Arabic grammar, syntax, vocabulary development, and sentence structure, with an emphasis on accurate usage in academic and professional contexts. Students will engage in reading comprehension exercises using literary and informational texts, as well as practice writing coherent and grammatically correct essays and reports. The module also enhances oral and listening skills through structured dialogues, presentations, and discussions. By the end of the course, students will be able to express themselves clearly and effectively in Arabic, both in writing and speech. This module is essential for developing strong communication skills, preserving cultural and linguistic identity, and preparing students for professional environments where Arabic is the primary language of communication.			

Module 9

Code	Course/Module Title	ECTS	Semester
UAID001	English language	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			

This module is designed to enhance students' proficiency in reading, writing, listening, and speaking. It covers essential grammar rules, vocabulary expansion, and effective communication strategies for academic and professional contexts. Students will practice essay writing, report drafting, and presentation skills while developing critical thinking through textual analysis. The module also emphasizes pronunciation, conversational fluency, and comprehension of diverse English accents. Interactive activities, group discussions, and multimedia resources help reinforce learning. By the end of the course, students will be able to express ideas clearly, construct well-structured arguments, and engage confidently in English-speaking environments. Ideal for non-native speakers and those seeking to refine their language skills for higher education or global workplace demands.

Module 10

Code	Course/Module Title	ECTS	Semester
MATH120	Fundamentals of Engineering Mathematics	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	87
Description			
Fundamentals of Engineering Mathematics module builds on foundational mathematical concepts, covering advanced topics essential for engineering and science disciplines. Students will explore integral and differential calculus, multivariable functions, partial derivatives, and multiple integrals, with applications in optimization and physics. The module also introduces linear algebra, including matrices, determinants, vector spaces, and eigenvalues. Differential equations—both ordinary (ODEs) and partial (PDEs)—are examined, along with analytical and numerical solution techniques. Emphasis is placed on problem-solving skills, logical reasoning, and applying mathematical models to real-world scenarios. Through exercises and computational tools, learners develop proficiency in mathematical analysis, preparing them for higher-level studies in engineering, physics, and computer science. This module is ideal for students seeking a strong analytical foundation for technical fields.			

Module 11

Code	Course/Module Title	ECTS	Semester
LAER120	AC Electrical Circuits	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	42
Description			

This module introduces students to the principles and behavior of alternating current (AC) electrical circuits, which form the foundation of modern electrical and electronic systems. Key topics include sinusoidal waveforms, phasor representation, impedance, reactance, resonance, and power in AC circuits. The course covers the analysis of AC circuit components such as resistors, inductors, and capacitors, both individually and in combination. Students will also study power factor, complex power, and techniques for power measurement and correction. Emphasis is placed on circuit theorems, frequency response, and the use of analytical tools such as Kirchhoff's laws and Thevenin's and Norton's theorems. Through hands-on lab sessions and simulation software, students will gain practical experience in building and analyzing AC circuits. By the end of the module, students will have a clear understanding of AC circuit operation, enabling them to apply these concepts in electrical engineering, automation, and system design.

Module 12

Code	Course/Module Title	ECTS	Semester
LAER121	Geometrical Optics	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	42
Description			
This module provides a comprehensive introduction to the principles of geometrical optics, focusing on the behavior of light as it travels through different media. Students will study fundamental concepts such as reflection, refraction, dispersion, and image formation using mirrors and lenses. The course covers ray tracing techniques, optical path length, and the derivation of lens and mirror equations. Special emphasis is placed on optical instruments including microscopes, telescopes, and cameras, as well as their design and applications. Students will explore real-world optical systems through both theoretical analysis and hands-on experiments. Laboratory sessions are designed to reinforce key concepts by allowing students to measure focal lengths, analyze optical aberrations, and construct simple imaging systems. By the end of the module, students will gain practical skills and theoretical understanding of light behavior, laying the groundwork for further studies in optics, photonics, biomedical imaging, and related engineering fields.			

Module 13

Code	Course/Module Title	ECTS	Semester
LAER122	mechanical engineering	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	57
Description			
This module offers a foundational understanding of the core principles and practices in mechanical			

engineering. It introduces students to key topics such as statics, dynamics, thermodynamics, fluid mechanics, and material science. Emphasis is placed on understanding mechanical systems, analyzing forces, energy transformation, and the behavior of materials under different conditions. Students will explore the design and operation of machines, engines, and mechanical structures, learning how to apply engineering concepts to solve practical problems. The module also covers basic mechanical drawing and the use of CAD (Computer-Aided Design) tools. Through theoretical lectures, problem-solving exercises, and laboratory sessions, students gain hands-on experience in mechanical measurements and experimental methods. This course serves as a stepping stone for advanced mechanical systems, robotics, and mechatronics, preparing students for further study or entry into various fields of mechanical and industrial engineering.

Module 14

Code	Course/Module Title	ECTS	Semester
LAER123	Software Engineering	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	12
Description			
This module introduces students to the fundamental principles, methodologies, and tools used in the design, development, and maintenance of software systems. Topics covered include software development life cycles (SDLC), requirements analysis, software architecture and design, coding practices, testing, debugging, and software project management. Emphasis is placed on software engineering best practices such as modularity, abstraction, reusability, and maintainability. Students will work on team-based projects to gain practical experience in using version control systems, integrated development environments (IDEs), and documentation techniques. The course also explores Agile and Waterfall methodologies, object-oriented design, and software quality assurance. Through case studies and hands-on labs, students will develop the skills needed to build robust and scalable software solutions. This module lays the groundwork for advanced study in software development, systems design, and artificial intelligence applications, and prepares students for careers in software engineering, IT, and related fields.			

Module 15

Code	Course/Module Title	ECTS	Semester
WORK120	Workshop Technology	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	3	48	2

Description
This module provides students with essential hands-on experience and practical knowledge of workshop processes and manufacturing techniques used in engineering applications. It covers fundamental operations such as fitting, machining, welding, casting, and sheet metal work. Students will learn to operate various tools and machines safely and accurately, including lathes, milling machines, drill presses, and welding equipment. The module also introduces metrology and quality control practices to ensure precision in fabrication and assembly. Emphasis is placed on understanding material properties, tool selection, manufacturing safety protocols, and interpreting technical drawings. Through supervised workshop sessions and practical assignments, students gain the ability to plan and execute basic manufacturing tasks. This course is designed to build confidence in handling equipment and materials, forming a strong foundation for future studies in mechanical engineering, robotics, and industrial design, while enhancing problem-solving and technical skills relevant to real-world engineering environments.

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