

Al-Furat Al-Awsat Technology University

جامعة الفرات الأوسط التقنية



First Cycle – Bachelor's Degree (B. Tech) – Laser & Optoelectronics Engineering Technology.

بكالوريوس – تقنيات هندسة الليزر والبصريات الالكترونية

The Department of Laser & Optoelectronics Engineering Technology in Najaf is part of the Najaf Technical College of Engineering, one of the colleges affiliated with Al-Furat Al-Awsat Technical University. This department was established in 2017 with the aim of qualifying technical engineers capable of meeting the needs of the Laser & Optoelectronics labor market. The college is located in Najaf Governorate and aims to provide distinguished education in Laser & Optoelectronics sciences and technology, including laser applications and Optoelectronics.



The educational program used in the Department of Laser & Optoelectronics Engineering Technology is based on a track called the Bologna process.

It is a multi-purpose process that aims to establish a framework that makes higher education qualifications comparable in their certificates and the information they contain, facilitates the comparison of university degrees across European Union countries, enables the adoption of similar quality standards, and helps higher education in student employment and global competitiveness

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1. Mission & Vision Statement

Vision Statement

The Department of Laser Technologies and Electro-Optics Engineering at Al-Furat Al-Awsat Technical University - Engineering Technical College of Najaf seeks to be a major tributary in preparing highly qualified specialized persons in engineering laser and electro-optical technologies, which will cover wide spectrum of work in the industrial, engineering and medical fields in the public sectors and private.

Mission Statement

1. Graduated qualified engineers in the fields of lasers and optoelectronics who have the ability to design, analyze and find appropriate solutions to practical problems and deal with advanced technology with high skill.
2. Preparing qualified graduates to participate in postgraduate studies inside and outside Iraq, and to work in research centers.
3. Engage in preparing practical research in the field of lasers and electro-optics to solve practical problems and contribute to community service.
4. Active participation in community development, upgrading the organization of conferences and seminars, as well as continuing education in the field of technical engineering, and adopting a methodology for continuous improvement in all activities.

2. Program Specification

Programd code:		ECTS	240
Duration:	4 levels, 8 Semesters	Method of Attendance:	Full Time

The laser and optoelectronics are a wonderfully wide-ranging subject. The emphasis of the program is the whole construction and repairing to which everything and anything at several different related fields. The degree is popular - for some it's the breadth of the subject that appeals, for others it's a path to specialization. All students have the opportunity to transfer onto our specialist degrees in whole branches of laser and opto-electronics technical engineering at the end of the first year.

Level 1 exposes students to the fundamentals of laser and opto-electronics, suitable for progression to all programs within the laser program group. Program-specific core topics are covered at Level 2 preparing for research-led subject specialist modules at Levels 3 and 4. Laser and opto-electronics graduate is therefore trained to appreciate how research informs teaching, according to the University and School Mission statements.

At Levels 2, 3 and 4 students are free to choose more than half of their module credits with the proviso a range of modules are selected that reflect the complexity of life forms. This allows students to develop their own wide-ranging interests in laser. Decisions on what to study are made with input from personal tutors.

The research ethos is developed and fostered from the start via practical's, which are either embedded in lecture modules or taught in dedicated practical modules, research seminars and tutorials. There is a compulsory field course in Level 1, which students must pass in order to progress into Level 2, and optional field courses in Levels 2, 3 and 4. At Level 4 all students carry out an independent research project, which may be a xx credit library or data analysis project, or a xx credit field or laboratory based project.

Academic tutorials are held at Levels 1 and 2 with the same tutor, who is also the personal tutor, providing continuity and progressive guidance. Level 1 and 2 tutorials include a number of workshops to teach skills, e.g. library use and presentation skills, followed by assessed exercises, e.g. essays and talks, as opportunities to practice these skills in a subject- specific context.

International years and Industrial placements are also offered and individual needs are discussed with the appropriate tutor and accommodated wherever possible.

3. Program Objectives

The program objectives of the educational Engineering Technology program mean the achievements of the graduates in the short term, i.e. the skills acquired by the graduates of the department throughout their academic studies in the Engineering Technology College-Najaf (16) skills.

PO1	Knowledge and understanding	PO-1-1	An ability to apply knowledge of mathematics, science, and engineering.
		PO-1-2	Understand the professional and ethical responsibilities of the field of specialization
		PO-1-3	The ability to evaluate course outcomes with faculty, industry and professional practitioners, as well as employers and graduate students for improvement
		PO-1-4	Teaching leadership skills and the value of quality commitment, ethical behavior and respect for others.
PO2	Subject specific skills	PO-2-1	Ability to work and integrate into multidisciplinary teams
		PO-2-2	The ability to design and conduct experiments as well as analyze and interpret data.
		PO-2-3	The ability to use modern technologies, engineering skills and tools to practice engineering
		PO-2-4	The ability to identify and formulate engineering problems in the field of specialization
PO3	Thinking skills	PO-3-1	The ability to communicate effectively with those involved in the field of specialization in the civil and military aspects.
		PO-3-2	Recognition of the need and ability to engage in lifelong learning.
		PO-3-3	Knowledge of contemporary issues in the field of specialization.
		PO-3-4	Broad learning necessary to understand the global impact of engineering

			solutions and economic, environmental and social problems.
PO4	General and transferable skills (other skills related to employability and personal development)	PO-4-1	Ability to manage and work on aircraft ground and air support equipment.
		PO-4-2	The ability to design mechanically using the latest 3D design and simulation software, which is practical to meet the required needs within the field of specialization within a realistic framework in which environmental, economic and social constraints are imposed health and political.
		PO-4-3	The ability to work with the latest devices for diagnosing mechanical, electrical and electronic faults in laser systems, as well as the optics of the laser systems in use.
		PO-4-4	Demonstrating the ability to adapt and engage with closely related engineering disciplines—such as communication engineering, biomedical instrumentation, microelectronics, and photonic energy systems—in order to foster interdisciplinary integration and enhance the practical and theoretical competencies within the field of laser and optical technologies.

4. Student Learning Outcomes

The easiest statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire during their study period through the educational program and depend on the standards of the Iraqi National Council for Program Accreditation of Technology Engineering Colleges. The outputs of the educational program of the Laser & Optoelectronics Engineering Department are based on international standards and are adequate to the requirements of the specialized programs. This is a major task and requires a process of research and analysis by experts and specialists in those programs. Many international standards have been studied (Accreditation Board of Engineering and Technology ABET, Japan Accreditation Board of Engineering Education, United Kingdom Accreditation Board, Canada Accreditation Board of Engineering Education, International Engineering Alliance IEA) by specialists in the Ministry of Higher Education and Scientific Research from The Scientific Supervision and Evaluation Authority and the Iraqi National Council for Program Accreditation of Technology Engineering Colleges, after which ABET and IEA standards will be accredited in the specialization of a Bachelor of Technology program (Engineering Technology Degree program.)

The educational program outputs must achieve the objectives of the program through two continuous assessment and evaluation processes. After completing the requirements of the prepared program, the student will be able to:

Outcome 1

Selects and applies modern knowledge, techniques, skills, and optical/electronic devices in engineering activities related to laser systems, photonic instrumentation, and precision measurements.

Outcome 2

Selects and applies knowledge in mathematics, optics, electronics, and physical sciences to solve engineering problems involving laser applications, imaging systems, and photonic technologies.

Outcome 3

Conducts the required tests, experiments and measurements, and analyzes and interprets their results.

Outcome 4

It applies experimental results to improve engineering processes.

Outcome 5

Designs systems, components, or processes for engineering problems involving laser-based technologies, optical communication, and photonic integration, in alignment with the objectives of the educational program.

Outcome 6

Work effectively as a member or leader of a specialized engineering team.

Outcome 7

Identifies, analyzes, and solves engineering problems related to laser operation, optical system design, and photonic signal processing.

Outcome 8

Identifies and uses appropriate scientific and technological literature, and applies written, oral, and graphical communication effectively in both optical engineering and interdisciplinary environments.

Outcome 9

Participates in self-directed continuing professional development

Outcome 10

Works to understand and adhere to professional and ethical responsibilities.

Outcome 11

Understands the local and global impact of engineering solutions in laser and optical technologies and applies this understanding within the scope of their specialization.

Outcome 12

Adheres to the concepts of quality and strives for continuous improvement.

5. Academic Staff

Academic staff of the department

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6. Credits, Grading and GPA

Credits

ATU is following the Bologna Process with the European Credit Transfer System (ECTS) credit system.

The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail.

Therefore, the results are independent of the students who failed a course.

The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Grade Point Average (GPA)

The GPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

GPA of a 4-year B.Sc. degrees:

$$\text{GPA} = [(1\text{st module score} \times \text{ECTS}) + (2\text{nd module score} \times \text{ECTS}) + \dots] / 240$$

7. Curriculum/Modules

SWL	Student Workload
SSWL	Structured SWL
USSWL	Unstructured SWL

Semester 1 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	pre - request
		hr/sem	hr/sem	hr/sem			
ATUU113	English Language	18	32	50	2.00	B	non
ATU15011	Electrical Circuits	123	27	150	6.00	C	non
ATU15013	Mathematics	63	87	150	6.00	B	non
ATU1111	Computer	48	27	75	3.00	B	non
ATUU111	Democracy & Human Rights	33	17	50	2.00	B	non
ATU15014	Laser Principles	123	52	175	7.00	C	non
ATU15015	Workshops Technology	63	37	100	4.00	B	non
		471	279	750	30.00		

Semester 2 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15028	Mechanical Engineering	63	87	150	6.00	B	non
ATU15022	Digital Fundamentals and Logics	93	32	125	5.00	S	non
ATU15027	Laser Physics	123	77	200	8.00	C	non
ATUU13	Arabic Language	18	32	50	2.00	S	non
ATU15025	Engineering Drawing	63	62	125	5.00	S	non
ATU15029	General Chemistry	63	37	100	4.00	S	non

Semester 3 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15031	Computer Programming Language	48	27	75	3.00	S	non
ATU15032	Application of Mathematics	63	62	125	5.00	S	non
ATU15033	Electronics	123	2	125	5.00	C	non
ATU15034	Electromagnetic Fields	63	62	125	5.00	C	non
ATU15035	Probability Theory	33	67	100	4.00	S	non
ATU15036	Optics	123	27	150	6.00	C	non
ATUU211	Baath party crimes	18	32	50	2.00	S	non
		471	279	750	30.00		30

Semester 4 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15041	Biology	63	12	75	3.00	S	non
ATU15042	Digital Techniques	93	7	100	4.00	S	non
ATU15043	Laser Detection Systems	93	82	175	7.00	C	non
ATU15044	Signals and Systems	63	37	100	4.00	B	non
ATU15045	Engineering Physics	63	62	125	5.00	C	non
ATU221	English Language	18	32	50	2.00	B	non
ATU222	Computer	48	27	75	3.00	S	non
ATU220	Arabic Language	18	32	50	2.00	B	non
		459	291	750	30.00		30

Semester 5 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15051	Power Electronic	63	87	150	6.00	C	non
ATU15052	heat transfer	63	37	100	4.00	S	non
ATU15053	Laser Systems	123	52	175	7.00	C	non
ATU15054	Engineering Analysis	48	52	100	4.00	B	non
ATU15055	Quantum Mechanics	48	27	75	3.00	S	non
ATU15056	optical network	63	12	75	3.00	B	non
ATU15057	Arduino Programming	48	27	75	3.00	S	non
		456	294	750	30.00		30

Semester 6 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15061	Biomedical optics	93	82	175	7.00	C	Non
ATU15062	Optical Fiber Technology	93	57	150	6.00	C	Non
ATU15063	Spectroscopy	63	37	100	4.00	S	Non
ATU15064	Laser Tissue Interaction	33	67	100	4.00	C	Non
ATU15065	Optoelectronics devices	93	32	125	5.00	C	Non
ATU15066	Optical Waves Propagation	63	37	100	4.00	B	Non
		438	312	750	30.00		30

Semester 7 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15071	Solid State Lasers	123	77	200	8.00	C	non
ATU15072	Microcontroller Applications	123	27	150	6.00	C	non
ATU15073	Medical Laser Systems	63	62	125	5.00	S	non
ATU15074	Semiconductor Devices	63	62	125	5.00	C	non
ATU15075	Engineering Management	33	67	100	4.00	B	non
ATU15076	Ethics	33	17	50	2.00	B	non
		438	312	750	30.00		30

Semester 8 | 30 ECTS | 1 ECTS = 30 hrs

Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
		hr/sem	hr/sem	hr/sem			
ATU15081	Laser Applications	123	77	200	8.00	C	Non
ATU15082	Gas Lasers	63	112	175	7.00	C	Non
ATU15083	free space optical communication	93	57	150	6.00	S	Non
ATU15084	Control Theory	123	27	150	6.00	S	Non
ATU15085	Final Year Project	63	12	75	3.00	C	Non
		465	285	750	30.00		30

8. Contact

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