

UNIVERSITY of TECHNOLOGY

الجامعة التكنولوجية



Bachelor of Science (B.Sc.) - Laser Science and
Technology

بكالوريوس علوم وتكنولوجيا الليزر



Table of Contents | جدول المحتويات

1. Mission & Vision Statement	بيان المهمة والرؤية
2. Program Specification	مواصفات البرنامج
3. Program Goals	أهداف البرنامج
4. Student learning outcomes	مخرجات تعلم الطالب
5. Academic Staff	الهيئة التدريسية
6. Credits, Grading and GPA	الاعتمادات والدرجات والمعدل التراكمي
7. Modules	المواد الدراسية
8. Contact	اتصال

1. Mission & Vision Statement

Vision Statement

- Preparing teaching staff in laser sciences and technology.
- Preparing graduates with a bachelor's degree who are equipped with the necessary knowledge to contribute in the management of the scientific and technological departments required for the scientific development of the country.
- Preparing academics and researchers holding master's and doctoral degrees to meet the country's need for them in various scientific and technological sectors.

Mission Statement

Since its inception, the branch seeks to have a distinguished role in contributing to the country's various activities in the fields of laser, light, electro-optics, and laser material processing.

This has been achieved by qualifying the graduates of the branch to accommodate them to work in the institutions of the Ministries of Health, Industry, Oil, Defense, Communications, Science and Technology.

The branch aims to expand the circle of its activities to include entry into new fields in the ministries of oil, environment and agriculture after the branch has well intertwined with the specialty of nanotechnology.

2. Program Specification

Programme code:	BSc-Laser science and technology	ECTS	240
Duration:	4 levels, 8 Semesters	Method of Attendance:	Full Time

Here are some general overview of program specifications for the field of Laser Science and Technology:

1. Fundamentals of Laser Science: This includes topics such as laser physics, laser optics, laser materials, and laser safety.
2. Laser Systems and Applications: Understanding the design, operation, and applications of laser systems in various fields, such as medicine, communications, manufacturing, and research.
3. Laser Diagnostics and Measurements: Techniques for measuring laser characteristics, including beam quality, power, and wavelength, as well as diagnostic methods to analyze laser performance.
4. Laser Materials and Components: Study of materials used in lasers, such as gain media, optical elements, and semiconductor lasers. This involves their properties, fabrication, and characterization.
5. Laser Engineering and Technology: Focus on laser system design, integration, and optimization, including aspects like beam shaping, mode control, and laser system stability.

6. Laser Safety and Regulations: Understanding the safety protocols, regulations, and standards associated with laser use, including laser hazards, safety practices, and compliance with regulatory requirements.
7. Advanced Topics in Laser Science: Optional courses covering advanced subjects like ultrafast lasers, nonlinear optics, quantum optics, laser spectroscopy, or laser applications in specific fields.
8. Laboratory Experience: Hands-on experience with laser systems, experiments, and laboratory techniques to reinforce theoretical knowledge and develop practical skills.
9. Research and Project Work: Opportunities for research projects, where students can contribute to advancements in laser science and technology, work on specific applications, or explore innovative ideas.

3. Program Goals

1. To offer a comprehensive education in laser science and technology that emphasizes scientific reasoning and problem-solving across various disciplines within the field.
2. To prepare students for diverse post-baccalaureate paths, including pursuing advanced degrees in laser science, joining professional training programs, or securing entry-level positions in industries related to laser science and technology.
3. To provide extensive hands-on training in electronic technology, statistical analysis, laboratory techniques, and field applications specific to laser science and technology.
4. To foster proficiency in written and oral communication of scientific information related to laser science and technology, enabling students to effectively convey their knowledge and findings.

5. To provide enriching opportunities for alternative education in laser science and technology, such as engaging in undergraduate research, internships, and study-abroad programs, to broaden students' understanding and practical experience in the field.

Student Learning Outcomes

Outcome 1

Knowledge of Laser Fundamentals

Students should acquire a solid understanding of the fundamental principles of lasers, including the properties of light, laser components, laser operation, and various laser systems.

Outcome 2

Laser Safety

Students should be trained in laser safety protocols and procedures, ensuring they can identify potential hazards, assess risks, and implement appropriate safety measures when working with lasers.

Outcome 3

Laser System Design and Operation

Students should gain the ability to design, build, and operate laser systems. This includes knowledge of laser beam characteristics, optics, laser diodes, control systems, and related technologies.

Outcome 4

Laser Applications

Students should be familiar with the diverse range of applications for lasers in fields such as manufacturing, medicine, communications, materials processing, research, and defense. They should understand how lasers are used and their impact on various industries.

Outcome 5

Laser Instrumentation and Measurement

Students should develop skills in using laser devices and measurement techniques. This involves understanding laser diagnostics, beam profiling, power measurement, and spectroscopic analysis.

Outcome 6

Problem Solving and Troubleshooting

Students should develop problem-solving skills and the ability to troubleshoot laser systems effectively. This includes identifying and rectifying common issues, diagnosing problems, and optimizing laser performance.

Outcome 7

Research and Innovation

Students should be encouraged to engage in research and innovation within the laser science and technology field. This involves developing critical thinking, experimental design, data analysis, and the ability to contribute to advancements in laser technology.

4. Academic Staff

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5. Credits, Grading and GPA

Credits

University of Technology 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:

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

6. Curriculum/Modules**Semester 1 | 30 ECTS**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MATH111	Mathematics	63	37	4.00	B	
MESO112	Mechanics and Sounds	123	127	10.00	B	
ENDR113	Engineering Drawing	48	2	2.00	S	
GECH114	General chemistry	78	172	10.00	B	
HURI115	Human Rights	33	17	2.00	S	
WOSH116	Workshops	45	5	2.00	S	

Semester 2 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
LAPR121	Laser Principle	63	112	7.00	C	
ELMA122	Electricity and Magnetism II	123	102	9.00	B	
COSC123	Computer Science	63	37	4.00	B	
ENLA124	English Language I	33	17	2.00	S	
LIGH125	Light	63	87	6.00	C	
WOSH126	Workshops	45	5	2.00	S	

Semester 3 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

Semester 4 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

Semester 5 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

Semester 6 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

Semester 7 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

Semester 8 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

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