University of Babylon

College of Science for Women

Department Laser Physics

Academic Program Description for Undergraduate Studies

Department of Laser Physics for the Academic Year

2025-2026

Academic Program Description

University Name: University of Babylon

College/Institute: College of Science for Women

Name of the academic or professional program: Laser Physics

Name of final degree: Bachelor's in Laser Physics

Study system: Undergraduate Studies / Bologna System

Description preparation date: 2/10/2025

Date of filling out the file: 15/10/2025

Signature:

Name of Department Head

Dr.Hussein Neama Najeeb

Date: 15/10/ 2025

Signature:

Name of Scientific Assistant

Dr. Kawthar Mohammed Ali Hassan

Date: 15/10/ 2025

The file is checked by

Department of Quality Assurance and University Performance

Dr.Mohammed J.Jader

Date: 15 /10 / 2025

Approval of the Dean

Introduction – Academic Program Description

The Department of Laser Physics is one of the leading scientific departments that aims to prepare specialized and qualified academic and research cadres in the field of lasers and their modern applications. The academic program adopted the Bologna Process system, first cycle, (2023-2024), which ensures a flexible educational structure based on credit hours and study units, in line with European standards for higher education. The program extends over (four academic years), (eight semesters), and includes (240) European units, each European unit equals (25 hours). Graduates are awarded a Bachelor's degree in Laser Physics.

The department is staffed with highly qualified faculty members possessing extensive academic and research experience in lasers, optics, and modern physics, who contribute significantly to enriching the educational process and guiding students toward academic excellence. The program is also distinguished by advanced laboratories equipped with state-of-the-art laser systems and optical measurement instruments, adopting a project-based learning approach that enhances students' innovation and their ability to solve complex scientific and technical problems. This approach effectively prepares graduates to engage in research and development or to work in advanced industrial and scientific sectors.

The program emphasises achieving Program Learning Outcomes (PLOs) aligned with the Bologna framework, including in-depth theoretical knowledge, practical and technical skills, research competencies, and critical thinking and problem-solving abilities. These outcomes equip graduates to actively contribute to scientific and industrial development and provide them with a competitive edge in the job market or in pursuing postgraduate studies at prestigious international universities

1. Program Vision

To be a regional and Arab leader in applied research on laser technologies, with a focus on innovative solutions to health and medical challenges, and a contribution to the development of the healthcare sector.

2. Program Mission

The Department of Laser Physics strives to prepare qualified scientific and research personnel in the field of laser physics and its medical applications, capable of developing laser technologies used in diagnosis and treatment, and contributing to improving the quality of life.

3. Program Objectives

The goals pursued by the Department of Laser Physics, in line with its specific vision, are as follows:

1. Develop specialized educational programs in medical lasers.
2. Conduct advanced research in medical laser applications, with a focus on surgical procedures, cancer treatment, dermatological therapy, and ophthalmology.
3. Establish partnerships with medical institutions and create joint research centers with hospitals.
4. Enhance international collaboration through participation in global research projects and hosting visiting scholars.
5. Develop laboratory infrastructure by equipping labs with the latest devices and

equipment, and establish a comprehensive database on lasers and their applications.

6. Support faculty members in obtaining higher academic degrees and encourage participation in scientific conferences and symposia.
7. Disseminate knowledge and publish a specialized scientific journal on lasers.

4. Programmatic Accreditation

nothing

5. Other External Influences

nothing

6. Program Structure

Program Structure	*Number of courses*	*Study unit*	*Percentage*	*Notes*
Institution Requirements	7	21	13.72%	Basic
College Requirements	4	12	7.84%	Basic
Department Requirements	40	118	78.43%	Basic
Summer Training	nothing	nothing	/	/

7. Program Description

The First stage are based on the Bologna system.

Year/level	course code	Name of the course	Credit hours	
			Theoretical	Practical
The first stage, Course (1), according to the Bologna system	UOBAB0602011	Electrical	2	2
	UOBAB0602012	Mechanics	4	2
	UOBAB0602013	Magnetism	2	2
	UOBAB0602014	Calculus	4	-
	UOBABb2	Arabic	2	-
	UOBABb1	English	2	–
The first stage, Course (2), according to the Bologna system	UOBAB0602021	properties of materiel	4	2
	UOBAB0602022	Principles of lasers and optical rays	4	2
	UOBAB0602023	differential equations	3	-
	UOBAB0602024	Life physics	2	-
	UOBAB0602025	Computer basics	1	1
	UOBABb3	Democracy and human rights	2	-

Program Description ***The Second stage are based on the Bologna system.***				
Year/level	***course code***	***Name of the course***	***Credit hours***	
			Theoretical	***Practical***
Second stage Course (1), according to the Bologna system	LPHY2311	Geometrical optics	2	2
	LPHY2312	Introduction to laser physics	2	2
	LPHY2313	Modern physics	2	2
	LPHY2314	Analogue Electronics	2	2
	LPHY2315	Principles of analytical mechanic	2	-
	UOBAB2004	Computer Science II	2	1
	UOBAB2301	Baath Party crimes	2	-
Second stage Course (2), according to the Bologna system	LPHY2401	Optical systems	2	2
	LPHY2412	Laser physics	2	2
	LPHY2413	Atomic and molecular physics	2	2
	LPHY2404	Laser Remote sensing	2	-
	LPHY2405	Thermodynamics and statistics	3	-
	LPHY2406	Digital Electronics	2	2
	UOBAB2001	Arabic language	2	-
	UOBAB2302	English language	2	-

Program Description ***The third stage are based on the Bologna system.***				
Year/level	***course code***	***Name of the course***	***Credit hours***	
			Theoretical	***Practical***
Third stage Course (1), according to the Bologna system	LPHY3511	Fundamentals of laser techniques	2	2
	LPHY3512	Introduction to physical optics	2	2
	LPHY3513	Introduction to electromagnetism	2	-
	LPHY3514	Spectroscopy	2	2
	LPHY3515	Introduction to solid state physics	2	2
	LPHY3506	Special functions and Modeling	2	2
Third stage Course (2), according to the Bologna system	LPHY3611	Laser techniques	2	-
	LPHY3612	Physical optics	2	2
	LPHY3613	Electromagnetic theory	2	-
	LPHY3604	Spectroscopic instrumentation	2	2
	LPHY3615	Solid state physics	2	2
	LPHY3606	Quantum mechanics	2	-

Program Description ***The four stage are based on the Bologna system.***				
Year/level	***course code***	***Name of the course***	***Credit hours***	
			Theoretical	***Practical***
Four stage Course (1), according to the Bologna system	LPHY4711	Physics of semiconductors	2	-
	LPHY4712	Basic laser designs	2	-
	LPHY4703	Optical fibers	2	2
	LPHY4714	Plasma physics	2	-
	-	Research methodology	2	-
	LPHY4715	Research project	1	1
Four stage Course (2), according to the Bologna system	LPHY4801	Laser applications	2	2
	LPHY4802	Advanced laser designs	2	2
	LPHY4803	Plasma and vacuum techniques	2	-
	LPHY4804	Detectors	2	2
	LPHY4805	Nanotechnology	2	-
	LPHY4806	Research project	1	1

8.The expected learning outcomes of the program	
Knowledge	
A-Knowledge and Understanding	A1- To become familiar with the nature of laser beams. A2- To identify the types of laser beams. A3- To be able to use different types of lasers in applications. A4- To analyze laser device systems.
Skills	
B-Subject-Specific Skills	B1- The student understands of the physical nature of the laser beam. B2- The student's ability to work with laser beams and laser systems. B3- Enabling students to analyze the quality of laser beam applications in medicine and industry. B4- Reviews of systems for analyzing industrial quality measurement in laser applications.
C-Thinking Skills	C1- Thinking skills according to the student's ability. C2- Advanced thinking skills. C3- Critical thinking strategy in learning.
Evaluation	
Evaluation methods	1- Exams 2- Learning Matrix 3- Which Face 4- CAT (student feedback) 5- Learning Triangle

9. Teaching and Learning Strategies

Learning strategies

1-Thinking strategy according to the student's ability (for example: if the student is able to learn the correct concept of management, he will acquire the skill of managing and organizing his personal life).

2- High thinking skill strategy (for example, if the student wants to make a good decision, it is important that he thinks well before he makes the decision, and if he decides without thinking, or if he cannot think well, or if he cannot decide, or perhaps he will not decide, then this This means he does not have high thinking skills.)

3- Critical thinking strategy in learning (Critical Thanking) (It is a term that symbolizes the highest levels of thinking, which aims to pose a problem and then analyze it logically to reach the desired solution).

4-Brainstorming

Methods of teaching and learning

1- Method of giving lectures.

2- Student Center

3- Student groups

4- Workshops

5- (Scientific trips to follow up on the environmental reality)

6- Learning Technologies on Campus

7- (Experiential learning)

8- Application Learning)

10. Evaluation methods
1- Exams 2- Learning Matrix 3- Which Face 4- CAT (student feedback) 5- Learning Triangle

11. Teaching Staff

Academic staff

Academic Rank	*Instructor's name*	*Specialization*		*Special Requirements/skills (it applicable)*	*Number of the teaching staff*	
		General	*Special*		*staff*	*lecturer*
Professor	Dr. Ghaleb Abd Wahab Al-Dahsh	Physics	Solid - materials		√	
Professor	Dr.. Enas Muhammad Salman	Physics	Molecular quantum		√	
Professor	Dr. Jassim Mohammed Jassim	electrical engineering	Laser technology		√	
Professor	Dr. Wajeha Abd-Daem	Physics	Electro-optics		√	
Professor	Dr. Bassem Abd Latif Ghaleb	Physics	Nanotechnology laser		√	
Assistant Professor	Dr. Lazem Hassan Abboud	Physics	Molecular spectra		√	

Assistant Professor	Dr. Sadiq Hassan Lafta	Physics	Nuclear and environmental physics		√	
Assistant Professor	Dr. Qusay Muhammad Salman	Physics	Laser and molecular		√	
Professor	Dr. Jinan Ali Abd	Physics	Solid		√	
Assistant Professor	Dr. Nizar Salem Shanan	Physics	Visual communications		√	
Professor	Dr. Amir Khudair	Physics	Nanotechnology		√	
Assistant Professor	Dr. Muhammad Hamza Khudair	Physics	Laser and molecular		√	
Assistant Professor	Dr.. Saif Muhammad Hassan	Physics	Laser and molecular		√	
Assistant Professor	Dr. Hussein Neama Naguib	Physics	Molecular physics		√	
Assistant Professor	Dr.. Saddam Falih Haddawi	Physics	Lasers and electro-optics		√	
Assistant Professor	Dr.. Ahmed Baqir Reda	Physics	Laser techniques		√	
Assistant Professor	Dr.. Zahraa Jassim Mohammed	Physics	Laser applications		√	
Teacher	Dr.. Raed Majeed Sahib	Physics	Laser applications		√	
Teacher	Dr. sabah muafaq Abu Khamra	Physics	Molecular physics		√	
Teacher	Dr. Muhammad Jawad Jader	Physics	Plasma physics		√	
Assistant Professor	Dr. wasan Manati's	Physics	Solid Physics - Branes		√	
Assistant Professor	Dr. Ahmed Kazem Khudairi	Physics	Physics/Laser		√	

Teacher	Dr. Nagham Muhammad Obaid	Physics	Laser physics		√	
Assistant Professor	Dr.. Hamsa Naji Abdel	Physics	Life physics		√	
Teacher	Dr. Ziad Khalaf Nasser	Physics	Biomedical technologies		√	
Teacher	Dr. Lubna Abbas Muhammad	Physics	Laser physics		√	
assistant teacher	Anfal Fadel Ahmed	Laser physics	Thin films		√	
t teacher	Dr.Zahraa Yassin	Calculators	Computer software		√	
assistant teacher	Ali Khattab Shaker	Physics	Nanotechnology		√	
assistant teacher	Ali Hassan is a martyr	Mechanical engineering	Mechanical engineering		√	
assistant teacher	Zainab Shaker Muhammad	Physics	Nano physics		√	
assistant teacher	Hassan Ali Majeed	Physics	Laser physics		√	
assistant teacher	Rafi Toma Ahmed	Physics	Solid state physics		√	
assistant teacher	Khaled Mahdi Jassim	Physics	Laser physics		√	
assistant teacher	Asmaa Mahmoud Haider	Laser physics	Laser physics		√	
assistant teacher	Haider Hamid Saeed	Physics	Nuclear		√	
assistant teacher	Mohammad Reza Shaheed	Physics	Optics		√	

Professional Development

Mentoring new faculty members

Teaching, like any other art, can be acquired by practicing and following its methods and principles, provided that there is a sincere desire to practice the teaching profession, and the method in education means taking interconnected steps to reach a specific goal that you hope to achieve. Therefore, it must follow the basic principles of good teaching, which are:

1- Directing and guiding learners by creating educational situations that lead to desirable activities.

2- Providing an atmosphere of love, kindness and cooperation between the teacher and the learners and between the learners themselves through his love for his students without discrimination and not excessive feminization.

3- Adopting democratic leadership through the emotional relationship between the teacher and his students, which leads them to control based on mutual respect and creating a cooperative atmosphere between the students and between the teacher and his students.

Professional development for faculty members

1- Thinking strategy according to the student's ability (for example: if the student is able to learn the correct concept of management, he will acquire the skill of managing and organizing his personal life). And the high thinking skill strategy (for example, if the student wants to make a good decision, it is important that he thinks well before he makes the decision, and if he decides without thinking or if he cannot think well or if he cannot decide or perhaps he will not decide, this means He does not have high thinking skills.)

2- General and transferable skills (other skills related to employability and personal development).

3- Verbal communication.

4- Teamwork.

5- Analysis and investigation (collecting information systematically and scientifically to establish facts and principles for solving the problem).

12.Acceptance criterion

Central acceptance and parallel acceptance

13.The most important sources of information about the program

1- The website of the college and university.

https://csg.uobabylon.edu.iq/

https://csg.uobabylon.edu.iq/department/?cdid=4

https://csg.uobabylon.edu.iq/department/dep_lectures.aspx?cdid=4

2- University guide .https://systems.uobabylon.edu.iq /

3- The most important books and resources in the college library.

14.Program development plan

Applying the Bologna Process to students in the upcoming academic stages, along with organizing workshops and seminars to familiarize faculty members with the requirements of the Bologna Process, how to implement it, discussing its drawbacks and obstacles, and finding solutions to them. Working on developing the laboratory infrastructure, equipping the labs with the latest devices and equipment, and establishing a comprehensive information bank about lasers and their applications. Building partnerships with medical institutions and establishing joint research centers with hospitals.

The first stage, Course (1)

According to the Bologna system

Program skills Outline															
				Required program learning outcomes											
Year/Level	*Course Code*	*Course Name*	*Basic or optional*	*Knowledge*				*Skills*				*Ethics*			
				A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
The first stage, Course (1), according to the Bologna system	UOBAB0602011	Electrical	Basic	*	*		*	*		*		*		*	
	UOBAB0602012	Mechanics	Basic	*	*		*	*			*	*	*		
	UOBAB0602013	Magnetism	Basic	*		*		*	*			*		*	*
	UOBAB0602014	Calculus	Basic	*	*		*	*		*		*	*		
	UOBABb2	Arabic	Basic	*	*		*	*	*	*		*	*		
	UOBABb1	English	Basic	*	*			*	*			*		*	

The first stage, Course (2)

According to the Bologna system

Program skills Outline															
				Required program learning outcomes											
Year/Level	*Course Code*	*Course Name*	*Basic or optional*	*Knowledge*				*Skills*				*Ethics*			
				A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
The first stage, Course (2), according to the Bologna system	UOBAB0602021	properties of materiel	Basic	*	*		*	*		*		*		*	
	UOBAB0602022	Principles of lasers and optical rays	Basic	*	*		*	*			*	*	*		
	UOBAB0602023	differential equations	Basic	*		*		*	*			*		*	*
	UOBAB0602024	Life physics	Basic	*	*		*	*		*		*	*		
	UOBAB0602025	Computer basics	Basic	*	*		*	*	*	*		*	*		
	UOBABb3	Democracy and human rights	Basic	*	*			*	*			*		*	

Second stage Course (1)

According to the Bologna system

Program skills Outline															
				Required program learning outcomes											
Year/Level	*Course Code*	*Course Name*	*Basic or optional*	*Knowledge*				*Skills*				*Ethics*			
				A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Second stage Course (1) according to the Bologna system	LPHY2311	Geometrical optics	Basic	*	*			*		*		*	*	*	
	LPHY2312	Introduction to laser physics	Basic	*	*		*	*			*	*			
	LPHY2313	Modern physics	Basic	*	*			*	*			*	*		*
	LPHY2314	Analogue Electronics	Basic	*	*		*	*		*		*	*		
	LPHY2315	Principles of analytical mechanic	Basic	*	*		*	*	*	*		*			
	UOBAB2004	Computer Science II	Basic	*	*			*	*			*	*	*	
	UOBAB2301	Baath Party crimes	Basic	*	*		*	*	*	*		*			

Second stage Course (2)

According to the Bologna system

Program skills Outline															
				Required program learning outcomes											
Year/Level	*Course Code*	*Course Name*	*Basic or optional*	*Knowledge*				*Skills*				*Ethics*			
				A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Second stage Course (2) according to the Bologna system	LPHY2401	Optical systems	Basic	*	*			*		*		*	*	*	
	LPHY2412	Laser physics	Basic	*	*		*	*			*	*			
	LPHY2413	Atomic and molecular physics	Basic	*	*			*	*			*	*		*
	LPHY2404	Laser Remote sensing	Basic	*	*		*	*		*		*	*		
	LPHY2405	Thermodynamics and statistics	Basic	*	*		*	*	*	*		*			
	LPHY2406	Digital Electronics	Basic	*	*			*	*			*	*	*	
	UOBAB2001	Arabic language	Basic	*	*	*			*	*			*	*	
	UOBAB2302	English language	Basic	*	*	*			*	*			*	*	

Stage Third Course (1)

According to the Bologna system

Program skills Outline															
				Required program learning outcomes											
Year/Level	*Course Code*	Course Name	*Basic or optional*	*Knowledge*				*Skills*				*Ethics*			
				A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Third stage Course (1) according to the Bologna system	Fundamentals of laser techniques	LPHY3511	Basic	*	*			*		*		*	*	*	
	Introduction to physical optics	LPHY3512	Basic	*	*		*	*			*	*			
	Introduction to electromagnetism	LPHY3513	Basic	*	*			*	*			*	*		*
	Spectroscopy	LPHY3514	Basic	*	*		*	*		*		*	*		
	Introduction to solid state physics	LPHY3515	Basic	*	*		*	*	*	*		*			
	Special functions and Modeling	LPHY3506	Basic	*	*			*	*			*	*	*	

Stage Third Course (2)

According to the Bologna system

Program skills Outline															
				Required program learning outcomes											
Year/Level	*Course Code*	Course Name	*Basic or optional*	*Knowledge*				*Skills*				*Ethics*			
				A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Third stage Course (2) according to the Bologna system	LPHY3611	Laser techniques	Basic	*	*			*		*		*	*	*	
	LPHY3612	Physical optics	Basic	*	*		*	*			*	*			
	LPHY3613	Electromagnetic theory	Basic	*	*			*	*			*	*		*
	LPHY3604	Spectroscopic instrumentation	Basic	*	*		*	*		*		*	*		
	LPHY3615	Solid state physics	Basic	*	*		*	*	*	*		*			
	LPHY3606	Quantum mechanics	Basic	*	*			*	*			*	*	*	

Note:

- The skills framework for the fourth-year curriculum is not included, as it was not taught using the Bologna Process.

- The description applies to the first, second, and third years for the 2025-2026 academic year.

- The description applies to the fourth year for the 2026-2027 academic year.