	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Medical Physics	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	LASER	**Module Delivery**	
Module Type	CORE		☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**
Module Code			
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	1	**Semester of Delivery**	1
Administering Department	MPHY	**College**	College of Science
Module Leader	Dr. Alaa Jabbar Ghazai	**e-mail**	dr.alaa.ghazai@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	16/9/2025	**Version Number**	1.0
Laboratory staff	Dr.Ibrahim karim Abbas, Dr.Saif Mohsim,Dr.zaid malk,MSc.Marwa Ahmed,MSc.raghda Harith		

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Teaching the student the science principles of laser. 2. Familiarity with laser light phenomena and application areas. 3. Learn about real-life practical applications of laser.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student can learn about the introduction to lasers, in addition to the basic concepts of lasers and Einstein's relations. 2. The student can understand the common features of different laser modes. 3. The student can explain the properties of laser radiation, optical feedback, and laser oscillation. 4. The student will explain the dual laser and learn about the applications of lasers in various medical, industrial, and scientific fields. 5. Students' ability to apply what has been calculated theoretically in a practical way in the future.
Indicative Contents المحتويات الإرشادية	- Introduction to laser, Basic concepts of lasers, Einstein Relations. [15 hrs.] - Common Features of Lasers, Condition for Light Amplification, Population inversion, Gain coefficient, Optical cavity, Modes of laser cavity. [15 hrs.] - Characteristics of Laser Radiation, Types of lasers: solid-state, dye, and semiconductor lasers [20 hrs.] - Types of lasers: free electron and X-ray lasers Laser diode. Laser Applications: Medical application Industrial application, scientific application. [15 hrs.]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	- Discussing the topics of the curriculum book and supporting references Theoretical lectures including problem solving and discussion of homework. - Asking students a set of thinking questions during the lectures for specific topics. - Giving students homework that requires finding self-solutions.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	135	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	2, 5, 10, 12	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	Continuous	All
	Projects / Lab.	7	5% (5)	Continuous	All
	Report	7	10% (10)	Continuous	All
	Seminar	1	5% (5)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	14	LO # 1-13
	Final Exam	5hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction of laser**
Week 2	**Basic concepts of lasers: Spontaneous and stimulated emission and absorption**
Week 3	**Einstein Relations**
Week 4	**-Common Features of Lasers** **-Condition for Light Amplification**
Week 5	**Population inversion, Gain coefficient, Optical cavity, Modes of laser cavity.**
Week 6	**Characteristics of Laser Radiation**
Week 7	**Optical feedback and laser oscillation**

Week 8	**Types of lasers: solid-state, dye, and semiconductor lasers**
Week 9	**Types of lasers: gas and chemical lasers**
Week 10	**Types of lasers: free electron and X-ray lasers**
Week 11	**Laser diode**
Week 12	**Laser Applications: Medical application**
Week 13	**Laser Applications: Industrial application, scientific application**
Week 14	**Mid Exam**
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	Lab 1: Measurement of Laser Beam Divergence
Week 3-4	Lab 2: Measurement for the Refractive Index of Air by using laser beam
Week 5-6	Lab 3: Measurement of glass bottle thickness by using laser beam
Week 7-8	Lab 4: A-Measurement of distance between the grooves for compact disk B-determine un known Wavelength for laser beam
Week 9-10	Lab 5: Range Finder by using laser beam
Week 11-12	Lab 6: Determination of Minority Carrier Lifetime in P-N Junction.
Week 13	Lab 7: Gaussian Distributions
Week 14	Mid Exam
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Laser Physics and Applications, H. Weber, G. Herziger, R. Poprawe, Springer,2005	YES
Recommended Texts	Principles of laser, O. Svelto, Springer, 2010	YES
Websites		

APPENDIX:

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.



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي