Course Description Form

1. Course name :
Laser physics
2. Course Code :
ZU-ALT124-02CM
3. Semester / Year :
Second semester / First year
4. Description Preparation Date :
2026-2-28
5.Available Attendance Form :
In person
6. Number of Credit Hours (Total) / Number of Units (Total)
4h (Practical Lecture) / 2 Theoretical Lecture
7. Course administrator's name (mention all , if more than one name)
Name : Nassrin A. Hussein Email : nassrin.hussein@alzahraa.edu.iq

8. Course Objectives :	
The students gain a solid knowledge concerning laser and its properties and method of operation beside discriminating among the various types of lasers according to their active media and wavelength. Furthermore, the students will be able have a knowledge in respect to laser applications, special the medical ones.	This course aims at: •Knowing laser properties and compering them wit the normal light ones •Being able to discriminate among different types c laser throughout the transferences occur between th atomic levels •Knowing the structure of laser devises and how to use them •Adjusting the various types of lasers by knowing their active media and their wavelength •Having the ability to select the active media which suits their wavelength. •Studying how to prepare different types of lasers.

Teaching and Learning Strategies:
Lectures , Use Blackboard ,Group discussions , and presentations .

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Cognitive and Sentimental Skills	Electromagnetic Radiation,Electromagnetic Radiation in Matter. Electromagnetic Radiation in vacuum	In person attendance	Quizzes, assignments, and discussion
2	2	Cognitive and Sentimental Skills	Refraction of Light Beam - Snell Law	In person attendance	Quizzes, assignments, and discussion
3	2	Cognitive and Sentimental Skills	Proprieties of Laser Radiation : Monochromaticity , Directionality , .Coherence	In person attendance	Quizzes, assignments, and discussion
4	2	Cognitive and Sentimental Skills	low divergent angle, brightness	In person attendance	Quizzes, assignments, and discussion
5	2	Cognitive and Sentimental Skills	Lasing processes, Bohr model of the atom, Photons and the energy diagrams	In person attendance	Quizzes, assignments, and discussion
6	2	Cognitive and Sentimental Skills	Absorption of electromagnetic Radiation Spontaneous emission of electromagnetic Radiation	In person attendance	Quizzes, assignments, and discussion
7	2	Cognitive and Sentimental Skills	Decay Rate, Population at Thermodynamic Equilibrium Population Inversion, Stimulated Emission , Amplification	In person attendance	Quizzes, assignments, and discussion

8	2	Cognitive and Sentimental Skills	Three Level Laser, Four Level Laser	In person attendance	Quizzes, assignments, and discussion
9	2	Cognitive and Sentimental Skills	The Laser System, The laser active medium: The excitation mechanism , Collisions with atoms, Feedback Mechanism, Output Coupler	In person attendance	Quizzes, assignments, and discussion
10	2	Cognitive and Sentimental Skills	Operation of a Laser System - Interactive Applets: Laser Gain Fluorescence line shape of the laser, Fluorescence Linewidth	In person attendance	Quizzes, assignments, and discussion
11	2	Cognitive and Sentimental Skills	Laser Gain Curve Broadening the Fluorescence line, Loop Gain, Calculating Loop Gain (GL) Without Losses, Calculating Loop Gain (GL) With Losses	In person attendance	Quizzes, assignments, and discussion
12	2	Cognitive and Sentimental Skills	Calculating Gain Threshold (GL)th, , Saturation Gain in a Continuous Wave Laser, Pulsed Laser	In person attendance	Quizzes, assignments, and discussion
13	2	Cognitive and Sentimental Skills	Different Laser Types and their Characteristics, Gas Lasers, Excitation of a gas laser , Groups of Gas Lasers, Controlling the laser radiation properties, Some Common Laser Resonators. Selective coating on the cavity mirrors	In person attendance	Quizzes, assignments, and discussion

14	2	Cognitive and Sentimental Skills	Controlling the laser radiation properties, Some Common Laser Resonators. Selective coating on the cavity mirrors	In person attendance	Quizzes, assignments, and discussion
15	2	Cognitive and Sentimental Skills	Final exam	In person attendance	Quizzes, assignments, and discussion

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Basics of Laser Physics "2nd edition, 2017 " Switzerland Textbook of Laser Physics
Electronic References, Websites	