هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	*Optical Physics*
Course Code:	***2033104-4***
Program:	*Bachelor's in physics*
Department:	***physics***
College:	*College of* ***Science***
Institution:	***Taif University***
Version:	***2023***
Last Revision Date:	***2020***

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th level/3rd year)					
4. Course general Description:					
This course covers many items related to the light phenomena and its characterization. Students will study the nature of light and its propagation. Theories that described the nature of light will be studied. Also, the interference and diffraction of light waves will be covered. The polarization of light waves will be included. Students will train on many measuring tools based on interference, diffraction and polarization of the light. Moreover, about ten experiments related to the optics will be studied.					
5. Pre-requirements for this course (if any):					
Waves and vibrations 2032201-4					
6. Co-requisites for this course (if any):					
NONE					
7. Course Main Objective(s):					
• Provides the theoretical background of the nature of light • Study the phenomena of interference, diffraction and polarization of light waves. • Understand the basic concepts in physical optics for variety of applications. • Develop the skills which require the knowledge of ray optics and optical interferometry. • Demonstrate basic experimental skills by setting up laboratory equipment safely and efficiently. • Carry out experimental procedures, and report the results of the					

experiments related to interference, diffraction and polarization.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	6	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	45
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	List the physics theories discussing the nature of light.	K3	Lecture	Written exam
1.2	Identify the basic concepts of light interference, diffraction and polarization.	K1	Lecture and Group discussion	Written exam
2.0	**Skills**			
2.1	Solve problems related	S2	Lectures	Written exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	to light wave interference.			and Homework reports
2.2	Compare different types of light diffraction and derive the resultant distance of the interference fringes for many applications.	S3	Lecture and Group discussion	Written exam and Homework reports
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively within groups to set up many experiments in the lab of optics.	V2	Practical	Lab reports Lab exam
3.2	Act in a manner consistent with the ethical standards in public and personal attitudes.	V3	Practical	Indirect evaluation

C. Course Content

No	List of Topics	Contact Hours
1.	**Unit 1: Nature of light** • Theories of light • Dualism nature of light	3
2.	**Unit 2: Simple harmonic motion** • Phase angle • Differential equation of wave motion	6
3.	**Unit 3: Interference of light waves 1** • In the same direction (four cases) • In opposite and perpendicular directions	6
4.	**Unit 4: Interference of light waves 2** • Reflection • Refraction	6
5.	**Unit 5: Studying applications of light interference and solving related problems** • Young's double slit exp. • Newton's rings • Lloyd's mirror • Frenerl's double mirror	7

	• Frenel's biprism • Michlson interferometer • Jamin interferometer	
6.	**First periodic exam**	2
7.	**Unit 6: Diffraction of light** • Frenel's diffraction from an edge • FraunHofer diffraction (single slit, double slits and diffraction grating)	6
8.	**Unit 7: Polarization of light:** • Definition of light polarization • Techniques of light polarization • Polarization by reflection: Brewster's law • Polarization by refraction • Polarization by divergence • Applications: the polarometer	7
9.	**Second periodic exam**	**2**
10.	**Final revision**	**3**
	Part 2 (Lab work)	
1.	**Experiment 1:** Determination of the refractive index of a solution using Abbe's apparatus	3
2.	**Experiment 2:** Determination of the specific rotational index of a solution using a polarometer	6
3.	**Experiment 3:** Carrying out Newtons experiment for both reflection and transition mode	3
4.	**Experiment 4:** Determination of the light wavelength of a mercury gas lamp using Newtons rings	3
5.	**Revision**	3
6.	**Experiment 5:** Determination of different spectra wavelengths using a diffractometer	6
7.	**Experiment 6:** Determination of the angle of glassy prism	3
8.	**Experiment 7:** Determination of the refractive indexes of different media using a prism	3
9.	**Experiment 8:** Transmittance spectrum using UV-visible spectrophotometer	3
10.	**Reports evaluation and lab final exam**	**6**
	Total	**90**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam I	8th	20%
2.	Midterm exam II	13th	10%
3.	Activities	Periodically	10%
4.	Lab reports	Weekly/ 14th	15%
5.	Final Lab Exam	15th	5%
6.	Final exam	16th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Principles of Physical Optics 1st Edition; Charles A. Bennett; ISBN-13: 978-0470122129; 2007 • Optics Letters Optical Society of America journal
Supportive References	• Fundamentals of optics, Fourth Edition; Francis A. Jenkins and Harvey E. White, New York McGraw-Hill, Inc./ 1976, Print ISBN-13: 978-0072561913
Electronic Materials	• Interactive simulations for science and math: https://phet.colorado.edu/ • Blackboard lectures. • YouTube websites
Other Learning Materials	• CD associated with the textbooks (when available). • Lecture notes and PowerPoints presentations prepared by the lecturer.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Lecture room with max 60 seats • Optics Labs with max 20 places for each (some are provided with Data show). • Quantum optics research lab
Technology equipment (projector, smart board, software)	• data show • Smart Board • software

Items	Resources
Other equipment (depending on the nature of the specialty)	Optics lab • Lasers • Spectrophotometer

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	• Students	Direct
Effectiveness of Students assessment	• Instructor • Program coordinator • Departmental council • Faculty council	Indirect
Quality of learning resources	• Students • Instructor Faculty	Indirect
The extent to which CLOs have been achieved	• Program leaders	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**PHYSICS DEPARTMENT COUNCIL**
REFERENCE NO.	**NO. 4-45**
DATE	**27/09/2023 (12/03/1445)**

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Physics Department
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