Course Specification
(Bachelor)

Course Title:	Physical Optics
Course Code:	PHYS 0332
Program:	Bachler of Science in Physics (B.S)
Department:	Physics
College:	College of Science
Institution:	Majmaah University, Saudi Arabia
Version:	2023
Last Revision Date:	09/20/2023

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A. General information about the course:

1. Course Identification

1. Credit hours: 4(3,2,0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3/1st year)					
4. Course general Description:					
The course describes the fundamentals of optics. It covers the laws of optics such as polarization, diffraction, interference, and Laser. It also covers the different approaches to understand how the different components of the Laboratory work mutually.					
5. Pre-requirements for this course (if any)**:**					
PHYS 0231					
6. Co-requisites for this course (if any)**:**					
Nil					
7. Course Main Objective(s):					
By the end of this course, the student will be able to: 1. Develop a solid foundation in optics including, but not limited to, topics in electromagnetic wave propagation, ray optics, optical elements and devices, wave superposition, Fourier transforms, diffraction, polarization, interference, and coherence theory. Attention will be given to the proper mathematical development of these topics. 2. The course will also devote substantial time to applications of these ideas to spectrometers and interferometers, lasers, and optical system design. Understand the concept of light polarization and polarizer.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0%

No	Mode of Instruction	Contact Hours	Percentage
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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		45

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	Different types of diffractions.	**K(1):** Recognize the knowledge of fundamental concepts in classical physics (vibrations, waves and optics) **K(2):** Recognize the knowledge of fundamental concepts in classical physics (vibrations, waves and optics)	Lecture Exercises Quizzes Problem solving	Exams Quizzes Homework Assignments
1.2	Outline optical theories; their types and properties.		Lecture Exercises Quizzes Problem-solving	Exams Quizzes Homework Assignments
1.3	Describe Interaction of electromagnetic radiation with matter, and with each other.			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Provide a correlation between theory and practice and should help explain how scientists arrive at their theories from experimental approaches within the laboratory setting	**S(2):** Develop the skill for analysing/solving the physics-based problems in the fields of optics	Oral quizzes Class discussion Exercises Quizzes Problem solving	Homework Oral problems
2.2	Using optical theories		Oral quizzes Class discussion Exercises Quizzes Problem solving	Homework Oral problems
2.3	Statistical treatment of experimental data.			
3.0	**Values, autonomy, and responsibility**			
3.1	Participate in class discussion and think critically.	**V(1)**: Work effectively in groups as well as individually, Learn how to collect and classify the required topics using internet communication tools. **V(2):** Learn how to collect and classify the required topics using internet communication tools.	1. Give time bound task. 2. Group Presentation 3. Group assignments	Observation Group discussion Group Report e-learning quizzes
3.2	Acting responsibly and ethically in carrying out individual as well as group projects.		1. Give time-bound tasks. 2. Group Presentation 3. Group assignments	Observation Group discussion Group Report e-learning quizzes
3.3	Students use computational tools. Students use		4. Give time-bound tasks. 5. Group Presentation	Observation Group discussion Group Report e-learning quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	information technology in the classroom.		6. Group assignments	

C. Course Content

No	List of Topics	Contact Hours
1	**The nature of light, The superposition of waves**	**6**
2	**Interference of two-beams of light (division of the wavefront & division of amplitude), Interferometers (Young , Fresnel's biprism, Loyed mirror, Fresnel's double mirrors, wedge interferometer, Newton rings)**	**6**
3	**Mid-term 1**	**3**
4	**Michelson interferometer, Jamin & Mach-Zehnder refractometers), Interference of multiple beams, Fabry-Perot interferometer, Applications of interferometry.**	**6**
5	**Diffraction, Fraunhofer diffraction (single slit, two slits, multiple slits) - diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle).**	**6**
6	**Mid-term 2**	**3**
7	**Polarization - polarization by absorption, reflection, refraction & double refraction. Optical active materials & polarimeter. Interference of polarized light, Analysis of polarized light.**	**6**
8	**Electro-optics (Kerr effect & Pockels effect) , Magneto-optics (Faraday effect)**	**6**
9	**Review**	**3**
10	**Final Exam**	**2**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid exam*	week 6	15%
2.	e-learning quizzes	One/ semester	10%
3.	Homework	Every Lecture	15%
4.	Discussions	Every week	10%
5.	Writing Report	One/ semester	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
6.	Final exam *	End of the semester	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	An Introduction to modern optics, Ghata and Joy, New yourk:Micro-Hill Book Company,1972.
Supportive References	Optics, 4th ed., E. Hecht, Addison-Wesley, NY, 2001 • (this course does not follow Hecht, but many readings are from Hecht and problems from the book are assigned)
Electronic Materials	• http://demonstrations.wolfram.com • http://askthephysicist.com http://faculty.mu.edu.sa/y.mohamed
Other Learning Materials	Scientific videos in youtube (www.youtube.com). 2- Microsoft office for editing reports and graduate projects. 3- Origin pro software for making figures of the scientific research projects. 4- Math editing software for writing derivations

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, data show, Smart Board, software
Technology equipment (Projector, smart board, software)	Computer Lab. and Internet Lab.
Other equipment (Depending on the nature of the specialty)	Library, Wi-Fi internet connections

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Internal Reviewer committee	Direct
Effectiveness of students' assessment	Student Self-Assessment and Peer Assessment.	Indirect
Quality of learning resources	Peer Reviewer	Direct
The extent to which CLOs have been achieved	Internal Reviewer committee	Direct

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHYSICS DEPARTMENT COMMITEE
REFERENCE NO.	
DATE	15/01/2025