هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**Geometrical Optics**
Course Code:	**211PHYS**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**
Version:	**V2022**
Last Revision Date:	**20/12/2022**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	**Level 4/ Year 2**				
4. Course General Description This course is designed to provide students with the basic principles of geometrical optics covering reflection and refraction by a plane and spherical surface, prisms, optical fibers, lenses as well as optical instruments; like camera, human eyes, telescopes and microscopes. The laboratory explores geometrical optics through some experiments in refraction, prism, converging and diverging lenses, convex and concave mirrors, and some optical instruments.					
5. Pre-requirements for this course (if any): 101PHYS					
6. Co- requirements for this course (if any): None					
7. Course Main Objective(s) **This course is designed to provide students with the following:** - The concept of light - The foundations of Geometrical optical - The principal of elementary optical systems - The concept of image in optical instruments - The laboratory work and hands-on activities in geometrical optics.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	20	47.6
2.	Blended	2	4.8
3.	Laboratory	20	47.6
4.	Hybrid ● Traditional classroom ● E-learning		
5.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	20
3.	Field	
4.	Tutorial	
5.	Others (specify) Preparations for various assignments, Quizzes, exams and office hours	
	Total	42

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	**Recall** the nature of light, index of refraction, reflection, refraction law through plane and spherical surface, optical fibers, and dispersion of light through a prism, thin lenses, human eye and optical instruments.	PLO1.1	Lectures, blackboard, and visualization, brainstorming, group and interactive discussion, Interactive illustrations.	**Direct**: In-class interactive questioning, In-class quizzes Homework assignments, Mid-term Final exam **Indirect**: student survey
1.2	**Describe** the Principle of Reversibility, Fermat's Principle, The Huygens principle, lens maker's equation, the total internal reflection, dispersion of light through a prism, image obtained by an optical system, the function of the human eye and some optical instruments.	PLO1.1	Lectures, blackboard and visualization, brainstorming, group, and interactive discussion, Interactive illustrations	**Direct**: In class interactive questioning, In class quizzes Homework assignment, Mid-term Final exam **Indirect**: student survey
…				
2.0	Skills			
2.1	**Solve** various problems related to light, reflection and refraction at spherical and plane surfaces, prisms, thin lenses, mirrors, the human eye and optical instruments.	PLO2.1	Lectures, blackboard, and visualization, brainstorming, group and interactive discussion, Interactive illustrations, individual problem solving	**Direct**: In class interactive questioning, In-class quizzes Homework assignment, Mid-term Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	**Demonstrate** the ability to use ray tracing in studying geometrical optics.	PLO2.2	Lectures, blackboard and visualization, group and interactive discussion, Interactive illustrations, Individual ray tracing.	**Direct**: In class interactive questioning, Homework assignment, Mid-term Final exam **Indirect**: student survey
2.3	**Perform** laboratory experiments in geometrical optics and document their results, using correct procedures and protocols and analyze the obtained data.	PLO2.3	Hands on experiment, interactive discussion, discussion, Report	**Direct**: Assignments, Step-by-step checkpoint assessment of experiment, Final Practical Exam **Indirect**: student survey
2.4	**Develop** competencies in critical thinking, analyzing the obtained data, communication and writing lab reports.	PLO2.4	Open dialogue, individual presentation, writing a lab report.	**Direct**: Lab report, Observation, questioning, individual discussion, checking lab report. **Indirect**: student survey
3.0	Values, autonomy, and responsibility			
3.1	**Develop** the ability to work in groups and bear individual responsibility during lab work, interactive discussion and group assignments.	PLO3.1	Group discussion, group lab work	**Direct**: Observation, questioning, individual discussion **Indirect**: student survey
3.2	**Demonstrate** awareness of safety for own and other competencies during lab work.	PLO3.3	Interactive discussion- Case study, group assignment, open discussion - reviews	**Direct**: Observation, questioning, discussion- lab report **Indirect**: student survey

B. Course Content

Theoretical Part

No	List of Topics	Contact Hours
1.	Highlights on the optics developments and propagation of light	2
2.	Speed of light and methods of determination of it	2
3.	Reflection and refraction of light	2
4.	Total and Internal reflection of light	2
5.	Fiber optics and their applications	2
6.	Prisms and light dispersion	2
7.	Thin lenses and the formation of images	2
8.	Spherical Mirrors	2
9.	Human eye and vision defects	2
10.	Optical Instruments (camera, light microscope and telescope)	2
11.	Homework correction, various exams	2
Total		22

Experimental Part

No	List of Topics	Contact Hours
2.	Color Addition	2
2.	Snell's Law (by trapezoid)	2
3.	Refractive Index and Critical angle of Glass	2
4.	Convex mirror	2
5.	Concave mirror	2
6.	The focal length for a convex (converging) lens	2
7.	The Focal length for a Concave Lens	4
8.	The equivalent focal length of two convex lenses	2
9.	The refractive index of a prism using the spectrometer	2
10.	Microscope	2
Total		20

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Course work activities (HW, Quizzes, group work and other assignments)	distributed	15
2.	Mid-term exam	7	15
3.	Lab Report, communication, and lab competence Final practical exam	11	20
4.	Final Exam	12	50

*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	• Introduction to Optics (3rd Edition), Pedrotti, Frank L; Pedrotti, Leno M; Pedrotti, Leno S, 2006
Supportive References	• Modern Optics; Robert D. Guenther, John Wiley &Sons. Inc., 1990. • Optics (4th Edition) Hecht, Eugene. 2001.
Electronic Materials	https://www.cliffsnotes.com/study-guides/physics/light/geometrical-optics https://ocw.mit.edu/courses/mechanical-engineering/2-71-optics-spring-2014/lecture-notes/MIT2_71S14_lec2_notes.pdf https://icecube.wisc.edu/~karle/courses/phys202/202lecture22_Ch35.pdf https://phys.libretexts.org/Bookshelves/College_Physics/Book%3A_College_Physics_(OpenStax)/25%3A_Geometric_Optics
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom for 30 students • Geometrical Optics Laboratory for 15 students
Technology equipment (Projector, smart board, software)	• Data show- smart board, Blackboard
Other equipment (Depending on the nature of the specialty)	• Library

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer, and program leader	Indirect (CES)- Indirect
Effectiveness of students assessment		
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved		
Other		

Assessor (Students, Faculty, Program Leaders, Peers Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	DEPARTMENT BOARD
REFERENCE NO.	PHYS2304
DATE	28/2/2023