Course Specification
(Bachelor)

Course Title:	**Waves & Optics Laboratory**
Course Code:	**PHY 1282**
Program:	**Bachelor of Science in Physics.**
Department:	**Physics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	4
Last Revision Date:	***26/09/2024***

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 4/ Year2)					
4. Course General Description:					
Significant experiments chosen from light, optical instruments and polarization and other related topics. Attention is given to laboratory techniques and data analysis. Every class will have a short lecture introducing the procedures, concepts, formulas and instructions relevant to the experiment. The lecture will also cover what is expected in the lab-report; don't be late. Attendance and participation is mandatory. Experiments will usually be performed in groups, but each student will turn in an individual lab report.					
5. Pre-requirements for this course (if any)**:**					
Waves & Optics, PHY 1240					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					

- **Observe and analyze physical data relevant to some of the experiments in optics and wave.**
- **Provide students with a thorough understanding of the basic concepts of physics and the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of mathematical analysis.**
- **Develop the student's mathematical ability to manipulate formulae and derive correct numerical solutions that can be measured in the real world.**
- **Instruct students in the competent use of laboratory equipment to collect and record data, apply relevant mathematical models and perform required computations, and present the derived results as an application of a measured observation of the physical world**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**0**
2.	**Laboratory/Studio**	**30**
3.	**Field**	**0**
4.	**Tutorial**	**30**
5.	**Others (specify)**	**0**
Total		60

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Recognize the scientific method of inquiry to draw conclusions based on light wave and associated characteristics.**	**K1, K2**	• Lectures. • Tutorials. • Class discussions.	▪ Exams. ▪ Participation. ▪ Discussions.
1.2	**Describe the theoretical bases of light optics experiments.**	**K1, K2**	• Lectures. • Tutorials. • Class discussions.	▪ Exams. ▪ Homework. ▪ Quizzes.
1.3	**Describe the theoretical bases of laws of imaging and optical instruments experiments.**	**K1, K2**	• Lectures. • Class discussions. • Tutorials.	▪ Participation. ▪ Exams. ▪ Discussions. ▪ Homework.
2.0	**Skills**			
2.1	**Analyze experiments according to the plan besides the learning from lab lecture.**	**S1, S2**	▪ Lectures. ▪ Class discussions. ▪ Tutorials.	▪ Exams. ▪ Discussions. ▪ Participation.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.2	**Explain and use information from the output of experiment to draw conclusions.**	**S2, S3**	▪ Problem classes and group tutorial. ▪ Homework assignments as well as problems solutions.	▪ Exams. ▪ Discussions. ▪ Homework.
2.3	**Summarize conclusions and write reports.**	**S4, S5**	• Lectures. • Class discussions. • Tutorials. • Encourage students to use electronic mail and internal network for submitting homework and assignments. • Use digital library.	▪ Exams. ▪ Participation and activities of students in the course community and blackboard. ▪ Homework.
2.4	**Communicate in a clear and concise manner orally, paper and using IT for acquiring and analyzing information.**	**S4, S5**	• Lectures. • Class discussions. • Encourage students to use electronic mail and internal network for submitting homework and assignments. • Use digital library.	▪ Exams. ▪ Participation and activities of students in the course community and blackboard. ▪ Feedback and explanations.
3.0	**Values, autonomy, and responsibility**			
3.1	**Show the collaboration and inter-professionalism in class discussions or team works, as well as solve problems independently.**	**V1, V2, V3**	• Small team tasks • Open discussion at classroom. Office hours.	▪ Participation. ▪ Homework. ▪ Mini-project(s).

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction**	**5**
2.	**Experiment 1:** Reflection and refraction of light.	**5**
3.	**Experiment 2:** Laws of imaging.	**5**
4.	**Experiment 3:** Optical instruments.	**5**
5.	**Experiment 4:** Newton's rings in transmitted monochromatic light.	**5**
6.	**Experiment 5:** Interference at a Fresnel's mirror with an He-Ne laser.	**5**
7.	**Experiment 6:** Diffraction at a single slit.	**5**
8.	**Experiment 7:** Diffraction at a double slit.	**5**
9.	**Experiment 8:** Diffraction grating spectrometer.	**5**

10.	**Experiment 9:** Rotation of the plane of polarization with sugar solutions.	**5**
11.	**Revision.**	**10**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Class Activities (class quizzes, homework, solving problems, etc.....)**	**weekly**	**35 %**
2.	**Midterm Exam 1**	**6th week**	**7.5 %**
3.	**Midterm Exam 2**	**12th week**	**7.5 %**
4.	**Final Exam**	**15th week**	**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	
Supportive References	
Electronic Materials	**https://units.imamu.edu.sa/colleges/en/science/Pages/default.aspx**
Other Learning Materials	• Laboratory Manual supplied by the Department of Physics. • Laboratory Manual is available at the website of the Department of Physics.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- **Classrooms.** - **Labs.**
Technology equipment (projector, smart board, software)	- **Classroom equipped with a whiteboard and a projector.**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Second examiner	Indirect (The students complete the evaluation forms at the end of term. Final exam is evaluated by the second examiner)
Effectiveness of Students assessment	Instructors	Direct (exams, HW, project, …)
Quality of learning resources	Faculty Students	indirect (surveys)
The extent to which CLOs have been achieved	Instructors Program Leaders	Direct (excel sheet)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Quality Unit-Physics Department
REFERENCE NO.	Department council No. 06
DATE	26/09/2024