هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Laser Physics**
Course Code:	**PHYS26434**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**University of Bisha**
Version:	**3**
Last Revision Date:	25 July 2023

Table of Contents

A. General information about the course:

1. 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:	7th Level / 4th year

4. Course general Description

This course introduces fundamental principles of laser generation, properties of laser radiation, types of laser systems, and some laser applications.

5. Pre-requirements for this course:

NA

6. Co- requirements for this course:

NA

7. Course Main Objective(s)

Recognize the fundamental of laser and its applications.

2. Teaching mode (mark all that apply)

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

3. Contact Hours (based on the academic semester)

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

	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	Recognize the fundamental concepts of laser.	K.2	Lectures Solve problems	Written test Reports Homework Quizzes
1.2	Describe the different types of lasers systems.	K.2		
1.3	Explain the properties of Laser and some of their applications.	K.2		
2.0	Skills			
2.1	Solve problem in the fundamental concepts of laser.	S.1	Lectures Solve problems.	Written test Reports Homework Quizzes
2.2	Analyze the different types of lasers systems.	S.1		
2.3	Solve problem related to some application of Laser.	S.1	Presentation Work group	Reports Presentation
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently.	V.2	Self-learning	Reports Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction.** Properties of light. Emission and absorption of light. Interaction of radiation with matter. The Einstein relations.	4.5
2.	**Laser fundamentals** The gain coefficient. Attainment of population inversion.	4.5
3.	Types of pumping methods. The optical resonator.	4.5
4.	The threshold gain coefficient. The line shape function. Laser modes.	4.5

5.	**Operation of Practical Laser (Laser systems)** Doped Insulator lasers Impurity ion energy levels in solids. Pumping methods. Fresnel Losses.	4.5
6.	**Solid Laser.** The Nd-YAG laser and Nd-glass laser. Ruby laser. The Alexandrite Laser. **Semiconductor lasers**	4.5
7.	**Liquid Laser (dye Laser)** **Gas lasers** The He-Ne Laser. Argon Ion Laser. Carbon dioxide laser CO_2 Laser.	4.5
8.	**Properties of Laser Radiation** Laser linewidth. Laser frequency stabilization. Beam divergence.	4.5
9.	Beam coherence. Brightness. Focusing properties of laser radiation.	4.5
10.	**Laser applications** **Metrological and scientific application** Optical alignment Measurements of distance. Laser Doppler velocimetry	4.5
Total		45

Table: The matrix of consistency between the content and the learning outcomes of the course.

	Course Learning Outcomes						
	1.1	1.2	1.3	2.1	2.2	2.3	3.1
Topic 1	✓			✓			✓
Topic 2	✓			✓			✓
Topic 3	✓			✓			✓
Topic 4	✓			✓			✓
Topic 5		✓			✓		✓
Topic 6		✓			✓		✓
Topic 7		✓			✓		✓
Topic 8			✓			✓	✓
Topic 9			✓			✓	✓
Topic 10			✓			✓	✓

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %
4.	Final exam	End of Semester	50 %

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Laser principles and applications, J. Wilson and J. F. B. Hawkes, Prentice Hall Hertfordshire, (2010).
Supportive References	- Principles of Lasers, Orazio Svelto. Fifth Edition, (Springer Science+Business Medi, LLC,233 Spring Street, New York Ny10013, USA) (2010). - Laser Fundamentals, Silffvast W. T., Cambridge Univ. Pr., (1996).
Electronic Materials	- Blackboard. - PowerPoint presentations. - Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities	Classrooms, Physics lab.
Technology equipment	Data show or smart board.
Other equipment	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Extent of achievement of course learning outcomes.	Teachers, students.	Direct (Final exams), Indirect (Questionnaire).
Effectiveness of teaching.	Teachers, students.	Indirect (Questionnaire)
Effectiveness of assessment.	Teachers, students.	Indirect (Questionnaire)

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Teachers, students.	Indirect (Questionnaire)
Quality of facilities available	Teachers, students.	Indirect (Questionnaire)
Fairness of evaluation	Peer reviewer.	Direct (Final exams reevaluation).

G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	20
DATE	**17 August 2023**