Course Specifications

General Information

Course name	Introduction to Laser Physics
Course number	PHYS4310
Faculty	
Department	
Course type	Major Needs
Course level	4
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - Understand the fundamental principles of laser technology
2 - Identify different types of lasers and their applications
3 - Comprehend the operational modes of lasers
4 - Gain knowledge of laser applications
5 - Develop an understanding of laser safety
6 - Explore emerging trends and future developments in laser technology
7 - Analyze laser specifications and select appropriate lasers for specific applications

Intended Learning Outcomes

Knowledge and Understanding	* Demonstrate a comprehensive understanding of the principles and operation of lasers * Apply laser technology in practical settings * Identify and assess laser safety hazards * Evaluate and interpret laser applications * laser-based experiments or measurements. Stay * Communicate effectively about laser technology

Course Contents

1 - The "Introduction to Laser Technology" course provides an in-depth understanding of the fundamental principles, applications, and safety considerations related to lasers. This course is designed to familiarize students with the basic concepts of laser operation, types of lasers, and their diverse applications across various fields.
2 - Introduction to Lasers
3 - Laser Components and Systems
4 - Understanding laser components: gain medium, pump source, cavity, and output coupler.
5 - Different types of lasers: solid-state, gas, semiconductor, and dye lasers
6 - Laser system configurations and beam delivery methods
7 - Population inversion and stimulated emission
8 - Optical feedback and laser oscillation
9 - Modes of operation: continuous wave (CW) and pulsed lasers.
10 - Laser applications in industry, medicine, communications, research, and entertainment.
11 - Material processing: cutting, welding, drilling, and marking
12 - Laser spectroscopy and diagnostics
13 - Laser-based medical treatments and procedures
14 - Laser hazards and safety considerations
15 - Laser classification and regulatory standards
16 - Q switching and mode locking operation of laser
17 - Modyfing laser output

Teaching and Learning Methods

1 - Lectures: Traditional classroom lectures are used to deliver theoretical concepts, principles, and foundational knowledge related to lasers. Lectures provide a structured framework for understanding key concepts and theories.
2 - Multimedia Presentations: The use of multimedia tools, such as slideshows, videos, animations, and interactive simulations, enhances the learning experience by visually illustrating laser principles, operational modes, and applications. These visual aids help students grasp complex concepts more effectively.
3 - Demonstrations: Practical demonstrations involving laser equipment are conducted to provide students with hands-on experience and a deeper understanding of laser operation. These demonstrations may include laser beam profiling, alignment techniques, and experiments showcasing laser applications.
4 - Assignments and Projects: Assignments and projects are assigned to students to reinforce learning, encourage independent research, and apply their knowledge to practical scenarios. These assignments may involve researching laser applications in specific industries, evaluating safety protocols, or designing laser-based experiments.
5 - Online Resources and Discussion Forums: Supplemental online resources, including e-books, journal articles, and video lectures, may be provided to students for self-study and further exploration. Online discussion forums or platforms facilitate peer-to-peer interaction, knowledge sharing, and collaboration.

Students Assessment

Assessment Method	TIME	MARKS
quizzes	30	10
online quizzes	30	10
Med exam	60	30
Presentation	30	10
Final Exam	120	40

Books and References

Essential books	Laser Fundamentals" by William T. Silfvast
	Principles of Lasers" by Orazio Svelto
Recommended books	"Introduction to Laser Physics" by Alan Corney
	"Laser Electronics" by Joseph T. Verdeyen