

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Vibrations, Waves&Optics
Course number	PHYS2306
Faculty	
Department	
Course type	College Needs
Course level	2
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - Understanding the concepts of simple harmonic motion, wave motion, waves on strings and superposition of waves that leads to interference, standing waves Understanding the interference of light waves, diffraction of light and polarization of light. Problem solving in waves and optics.
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Intended Learning Outcomes

Knowledge and Understanding	* Define and understanding of any physical quantity introduced. List the types of waves and Illustrate the propagation of waves and superposition principle. Describe the various parameters of waves and their superposition. Evaluate the mathematical expressions of wave functions, velocity, power and intensity. Express mathematically the interference of waves, standing waves, the intensity of interference fringes and diffraction fringes and Malus law . Discuss the basic concepts of waves, optics Explain the wave motion, interference and diffraction of light waves
Intellectual Skills	* Analyze the wave motion, superposition of waves Problem solving on transverse wave parameters, Interference and Diffraction of light Apply the physical concepts to solve engineering problems Creative thinking for alternative views for sound waves, thin film interference,

## Course Contents

- 1 - Oscillatory Motion: Simple Harmonic Motion, The Block–Spring System, Energy of the Simple Harmonic Oscillator, The Pendulum, Damped Oscillations
- 2 - .Wave Motion: Basic Variables of Wave Motion, Direction of Particle Displacement, One-Dimensional Traveling Waves, Superposition and Interference, The Speed of Waves on Strings, Reflection and Transmission, Sinusoidal Waves, Rate of Energy Transfer by Sinusoidal Waves on Strings, The Linear Wave Equation
- 3 - Superposition and Standing waves: Superposition and Interference of Sinusoidal Waves, Standing Waves, Standing Waves in a String, Resonance
- 4 - .Electromagnetic Waves: Maxwell's Equations and Hertz's Discoveries, Plane Electromagnetic Wave, Energy Carried by Electromagnetic Wave ,Momentum and Radiation Pressure, Production of Electromagnetic Waves by an Antenna, The Spectrum of Electromagnetic Waves
- 5 - The Nature of Light and geometrical Optics: The Nature of Light, Measurements of the Speed of Light, The Ray Approximation in Geometric Optics, Reflection, Refraction, Huygens's Principle, Dispersion and Prisms, Total Internal Reflection
- 6 - . Interference of Light: Conditions for Interference, Young's Double-Slit Experiment ,Intensity Distribution of the Double-Slit Interference Pattern, Change of Phase Due to Reflection, Interference in Thin Films, The Michelson Interferometer, Newton's Rings
- 7 - Diffraction and Polarization: Introduction to Diffraction, Diffraction from Narrow Slits, Resolution of Single-Slit , The Diffraction Grating, Polarization of Light Waves.

## Teaching and Learning Methods

- 1 - The course is given as: 1.Lectures.2- Class tutorials. 3- Power point
- 2 - Several problems on the material are solve at the end of each unit
- 3 - In addition some assignments are given to the students as a homework

## Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
First Mid Exam	6th Week	20%
Second Hour Exam	12th Week	20%
Assignments, Homeworks and Seminar	through the semester	10%
Final Exam	17th Week	50%

## Books and References

Essential books	Fundamentals of Physics David Halliday, Robert Resnick and Jearl Walker John Wiley & Sons, 7th edition
Recommended books	1. Physics for Scientists and Engineers - Serway-Beichner, 6th edition 200 2. The Physics of Vibration and Waves, H. J. Pain John Wiley & Sons, 6th edition 2005