UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
PHYS-270	General Physics III	8
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	PHYS-160
Type of Course	**Field**	**Language of Instruction**
Elective	Science	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	2nd	Dr Marios Nestoros
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objectives of the course are to:

- Introduce students to the basic concepts of waves, optics and thermal physics.
- Help students develop an understanding of the principles taught as well as analytical problem-solving ability.
- Consolidate the basic principles discussed in the theoretical section of the course with laboratory demonstrations, and computer applets/simulations

Learning Outcomes:

After completion of the course students are expected to:

- Relate position, velocity, and acceleration in simple harmonic motion,
- Explain the importance of resonance in nature and engineering applications.
- Express mathematically a traveling wave and a standing wave as a result of interference.
- Explain the relation of the electric component and the magnetic component of a plane electromagnetic wave as well as its polarization states.
- Apply the laws of geometrical optics for mirrors, lenses and prisms.
- Describe Young's double slit experiment and its implications concerning the nature of light,
- Apply interference and diffraction to describe the propagation of light, sound and water waves through slits and around obstacles.
- Analyze and apply the laws governing the heat transfer mechanisms.
- Explain the concept of ideal gas and apply the ideal gas laws.
- Calculate the work done by an ideal gas and apply the First Law of Thermodynamics.
- Explain the postulates of Special Relativity and solve problems involving the effects of time dilation and length contraction.

Course Contents:

Lectures

1. Temperature, Zeroth law of thermodynamics, thermal expansion. Heat, First

law of thermodynamics, convection, radiation and conduction

2. Kinetic theory of gases. Ideal gases, pressure and temperature. Translational kinetic energy, molar specific heats. Entropy and the second Law of thermodynamics.
3. Oscillations, Resonance, Wave equation, wavelength, frequency, superposition, interference, standing waves. Propagation of sound waves, Doppler Effect.
4. Electromagnetic waves, radiation pressure, polarization.
5. Geometrical optics, reflection, refraction, mirrors, lenses.
6. Light as a wave, Young's double slit experiment, Diffraction: single-slit and double slit, Rayleigh's resolution criterion, diffraction gratings.
7. Relativity: time dilation, length contraction, Lorenz transformation, transformation of velocities, relativistic Doppler Effect, momentum and energy.

Simulations and Demonstrations:

Simple harmonic motion, forced oscillation and resonance, traveling wave, interference and standing waves along strings and air columns, reflection and refraction of waves, water waves (ripple tank), reflection and refraction of light, diffraction and interference of light.

Teaching Methods:

Lectures (3 hours/week); Demonstrations & Simulations (1 hour/week)

Assessment Methods:

Midterm Test, Homework, Final Examination

Required Textbooks:

Authors	Title	Publisher	Year	ISBN
Halliday, Resnick, Walker	Fundamentals of Physics	Wiley	8th Edition	9780470 044728

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Ben Crowel	Vibrations and Waves	http://www.lightandmatter.com/		
Ben Crowel	Optics	http://www.lightandmatter.com/		