Course Specifications

General Information

Course name	
Course number	PHYS4312
Faculty	
Department	
Course type	Major Needs
Course level	4
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - This course provides an understanding of wave nature of light to describe different optical phenomenon like interference, diffraction, polarization, coherence, and holography

Intended Learning Outcomes

Knowledge and Understanding

* Describe and discuss waves, color, frequency, photon energy, phase difference, optical coherence and coherent sources using monochromatic light sources of light.
* Describe and discuss optical interference observed using wavefront splitting and amplitude splitting interferometers, optical antireflection coatings.
* Describe and discuss linear, circular and elliptical polarization, Birefringence and use of polarized light.
* Describe and discuss diffraction effects observed in a single slit and circular aperture and relate to Rayleigh criterion and optical resolution.
* Describe the characteristics of coherent light and relate it to holography and laser.

Course Contents

1 - Electromagnetic theory: Photons, and light; The propagation of light: reflection, refraction, Fermat's principle, total internal reflection, Optical properties of materials; The superposition of waves: The addition of waves of the same and different frequency, anharmonic periodic waves, nonperiodic waves; Polarization: Polarizers, Dichorism, Birefringence, Polarization by reflection, retarders, Circular polarization, Optical activity, Johns matrix; Interference: Conditions of interference, Wavefront and amplitude splitting interference, Multiple beam interference, applications, Michelson interferometer; Diffraction: Fraunhofer, Fresnel, Kirchhoff's Scalar Diffraction theory; Coherence: Visibility, Degree of coherence, and Holography.

Teaching and Learning Methods

1 - lectures
2 - Homeworks
3 - Experiments

Students Assessment

Assessment Method	TIME	MARKS
Homework	Weekly	30
Midterm	60 min	30
Final	120 minute	40

Books and References

Course note	Eugene Hecht, Optics, 5th Edition, Adson Wesley, 2016
Essential books	Pedrotti, Leno M. et al., Introduction to Optics, Addison-Wesley; 4th edition, 2017
	Grant R. Fowles, Introduction to Modern Optics, Dover Books on Physics, 1989