Course Code	Course Title	L	T	P	C
BPHY201L	Optics	3	0	0	3
Pre-requisite	NIL	Syllabus Version			
		1.0			

Course Objectives

1. This course provides basics of geometrical optics to understand the properties of lenses and their uses in imaging applications.
2. This course provides basics of wave optics to understand wave properties of light; diffraction, polarization, interference and their applications.

Course Outcomes

1. Ability to understand and interpret the wave properties of light.
2. Acquire significant understanding of the role of optical elements such as lens, mirrors, etc.
3. Understand the principle of optical phenomena such as interference, diffraction and polarization.
4. Analyze interferometric techniques and its applications.
5. Realize the importance of scattering mechanisms.

Module:1	**Light Waves**	**5 hours**
Theories of light - Electromagnetic nature of light waves - Properties of light wave - Huygens principle - Fermat Principle and its applications		
Module:2	**Geometrical Optics**	**8 hours**
Optical Elements - Lens - Mirrors - Prism - Compound lens - Ray transfer matrix analysis - Reflection and Refraction by spherical spheres - The principle of focal length - Newton's formula - Aberrations - Optical Microscope		
Module:3	**Diffraction**	**9 hours**
Fraunhofer diffraction - Huygens-Fresnel Principle - Single slit - Double slit - Multiple slits - Diffraction grating - Fresnel Diffraction - Zone plate - Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis		
Module:4	**Polarisation**	**6 hours**
Polarization states of light - Transverse nature of light waves - Plane polarized light - production and analysis - Circular and elliptical polarization - Dichroism - Polarization by reflection - Birefringence - Polaroid – Sunglasses		
Module:5	**Interference**	**7 hours**
Interference - Young's Double Slit experiment - Lloyd's Mirror and Fresnel's mirror experiment - Interference in thin films - Fringes in wedge shaped films – Reflected and anti-reflected coating - Newton's Rings - Measurement of wavelength and refractive index		
Module:6	**Interferometry**	**4 Hours**
Michelson Interferometer - Fabry-Perot interferometer - Applications of interferometer		
Module:7	**Scattering**	**4 hours**
Rayleigh scattering - Mie scattering - Geometric scattering - Raman scattering - Stokes and Antistokes - Tyndal effect		
Module:8	**Contemporary Issues**	**2 hours**
Guest lecture from industry and R & D organisations		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Eugene Hecht, Optics, 2017, 5th Edition, Pearson.
2.	Ajay Ghatak, Optics, 2020, 7th Edition, McGraw Hill, India.
Reference Books	
1.	F. A. Jenkins and H. E. White, Fundamentals of Optics, 2017, 4th Edition, Tata McGraw-Hill.
2.	B.K. Mathur, Principles of Optics, 1995, Gopal Printing.
3.	H.R. Gulati and D.R. Khanna, Fundamentals of Optics, 2016, R. Chand & Co., India.
4.	F.W Sears, M.W Zemansky, H.D Young, University Physics. 2015, Student Edition, Addison-Wesley.
5.	Alessandro Bettini, A Course in Classical Physics 4 – Waves and Light, 2016, 1st Edition, Springer.
Mode of Evaluation: CAT, Written Assignment, Quiz and FAT	

Recommended by Board of Studies	20-06-2023		
Approved by Academic Council	No. 70	Date	24-06-2023