

SRM University – AP, Andhra Pradesh

Neerukonda, Mangalagiri Mandal
 Guntur District, Mangalagiri, Andhra Pradesh 522240

PHY 101 Engineering Physics

Course Code	PHY101	Course Category	Core Course	L-T-P-C	2	0	0	2
Pre-Requisite Course(s)	NA	Co-Requisite Course(s)	NA	Progressive Course(s)	NA			
Course Offering Department	Physics	Professional / Licensing Standards						
Board of Studies Approval Date		Academic Council Approval Date						

Course Objectives / Course Learning Rationales (CLRs)

Objective 1: To understand fundamental concepts of classical mechanics and elastic properties of solids.

Objective 2: To learn fundamentals of Electromagnetism and Maxwell's equation as the foundation of Maxwell's Equation.

Objective 3: To understand laws of Geometrical and Wave Optics and waves properties of light.

Objective 4: To familiarize about particle properties of waves and related fundamentals.

Course Outcomes / Course Learning Outcomes (CLOs)

	At the end of the course, the learner will be able to	Bloom's Level	Expected Proficiency Percentage	Expected Attainment Percentage
Outcome 1	Understanding fundamental concepts of classical mechanics	3	70%	65%
Outcome 2	Learning four Maxwell's Equations as foundation for Electromagnetism.	3	70%	65%
Outcome 3	Understanding Laws of Optics and waves properties of light	3	70%	65%
Outcome 4	Understanding particle properties of waves and related fundamentals	3	70%	65%

Course Articulation Matrix (CLO) to Program Learning Outcomes (PLO)

CLOs	Program Learning Outcomes (PLO)														
	Scientific and Disciplinary Knowledge	Analytical Reasoning and Problem Solving	Critical and Reflective Thinking	Scientific Reasoning and Design Thinking	Research Related Skills	Modern Tools and ICT Usage	Environment and Sustainability	Moral, Multicultural and Ethical Awareness	Individual and Teamwork Skills	Communication Skills	Leadership Readiness Skills	Self-Directed and Lifelong Learning	PS O 1	PS O 2	PS O 3
Outcome 1	3	3	3	2	1				2			2	3	1	2
Outcome 2	3	3	3	3	2				2			2	3	2	2
Outcome 3	3	3	3	3	2				2			2	3	2	2
Outcome 4	3	3	3	3	2				3			2	3	2	2
Course Average	3	3	3	3	3				2			2	3	2	2

Course Unitization Plan

Unit No.	Unit Name	Required Contact Hours	CLOs Addressed	References
Unit 1	CLASSICAL PHYSICS	6		
1.	Introduction	1	1	1, 2
2.	Newton's laws of mechanics, Free body force diagram	1	1	1, 2
3.	Momentum and Impulse, Conservation of linear momentum	1	1	1, 2
4.	Work-Kinetic Energy Theorem and related problems	1	1	1,2
5.	Conservation of mechanical energy: Worked out problems	1	1	1, 2
6.	Elastic properties of solids, Stress-strain relationship, elastic constants, and their significance	1	1	1, 2
Unit 2	ELECTRO-MAGNETISM – I	6		
7.	Focus on Maxwell's Equation I: Discuss lines of force and Electrostatic flux, Introduce Gauss's law (differential and integral form)	1	2	1, 2, 4
8.	Application of Gauss Law: ES field due to infinite wire and sheet.	1	2	1, 2, 4
9.	Electrostatic field due to conducting and insulating sphere.	1	2	1, 2, 4
10.	Concept of Electrostatic Potential and Potential Energy. Inter-relation with electrostatic field.	1	2	1, 2, 4
11.	Capacitor and Capacitance: Capacitance of a parallel plate capacitor.	1	2	1, 2, 4

12.	Focus on Maxwell's Equation II: Discuss absence of Magnetic monopoles!	1	2	1, 2, 4
Unit 3	ELECTRO-MAGNETISM - II	6		
13.	Introduce Biot-Savart Law as an alternative approach to calculate magnetic field.	1	2	1, 2, 4
14.	Calculate Magnetic field due to finite current element using Biot Savart Law.	1	2	1, 2, 4
15.	Focus on Maxwell's Equation IV: Discuss Ampere's circuital law.	1	2	1, 2, 4
16.	Calculate Magnetic field due to Infinite wire and Solenoid using Ampere's Law.	1	2	1, 2, 4
17.	Focus on Maxwell's Equation III: Lenz's Law and Faraday's law: Induced EMF and Current	1	2	1, 2, 4
18.	Describe Maxwell Equations as the foundation of electro-magnetism. Derive differential forms starting from Integral forms. Discuss Physical Significance.	1	2	1, 2, 4
Unit 4	OPTICS	6		
19.	Concept of Electromagnetic waves & EMW Spectra	1	3	1,2, 5
20.	Geometrical & Wave Optics: Laws of reflection and refraction	1	3	1,2, 5
21.	Concept of Interference	1	3	1,2, 5
22.	Phase Difference and Path Difference	1	3	1,2, 5
23.	Newton's Ring	1	3	1,2, 5
24.	The Michelson Interferometer	1	3	1,2, 5
Unit 5	Modern Physics	6		
25.	Black Body Radiation; Wien's displacement law	1	4	1,2,3
26.	Discussion on failure of classical laws to explain Black Body Radiation, and concept of Planck's Hypothesis	1	4	1,2,3
27.	What is Light? Photon and Overview on Planck Constant	1	4	1,2,3
28.	Photoelectric effect – Concept and Experimental Setup	1	4	1,2,3
29.	Photoelectric effect – Intensity vs Current, Frequency vs Kinetic Energy, the drawback of Wave theory to explain Photoelectric effect	1	4	1,2,3
30.	Wave properties of particle: De Broglie wave	1	4	1,2,3
TOTAL CONTACT HOURS		30		

Recommended Resources

1. University Physics with Modern Physics with Mastering Physics - D Young, Roger A Freedman And Lewis Ford, XII Edition (2018), Publisher – PEARSON
2. Physics for Scientist and Engineers - Raymond A. Serway, John W. Jewett, XIX Edition (2017), Publisher - Cengage India Private Limited
3. Concept of Modern Physics - Arthur Beiser, Shobhit Mahajan, S Rai, 2017 Edition, Publisher - Tata McGraw Hill

Other Sources

4. Introduction to Electrodynamics – David J. Griffiths. 4th Edition (2012), Publisher - PHI Eastern Economy Editions
5. Introduction to Geometrical and Physical Optics, B. K. Mathur, 7 Edition, Gopal Printing

Learning Assessment

Bloom's Level of Cognitive Task		Continuous Learning Assessments (50%)								End Semester Exam (50%)	
		CLA-1 (10%)		Mid-1 (15%)		CLA-2 (10%)		Mid-2 (15%)		Th	Prac
		Th	Prac	Th	Prac	Th	Prac	Th	Prac		
Level 1	Remember	60%		40%		60%		40%		70%	
	Understand										
Level 2	Apply	40%		60%		40%		60%		30%	
	Analyse										
Level 3	Evaluate										
	Create										
Total		100%		100%		100%		100%		100%	

Course Designers

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