

**SEMESTER LEARNING ACTIVITY PLANS
(SLAP)
SEMESTER EVEN 2022/2023**



Physics Undergraduate Study Program
Physics Department
Basic Physics II
MFF 1012/ 3 Credits

Lecturer Coordinator:
Dr. Rinto Anugraha NQZ

UNIVERSITAS GADJAH MADA
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
2022



Universitas Gadjah Mada
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Code	Course Name	Credits (Credits)		Semester	Status	Prerequisite
<i>MFF 1012</i>	<i>Basic Physics II</i>	<i>T: 3</i>	<i>P: ...</i>	<i>EVEN</i>	<i>Compulsory</i>	<i>None</i>
Short Description	Basic Physics II is a physics course that examines the phenomena of electricity, magnetism, optics, and modern physics. This course is a continuation of fundamental physics material I, which includes mechanics, oscillations, wave mechanics, and thermodynamics. By studying this course, students are expected to have a complete understanding of the basics of physics and its applications in advanced courses and several scientific phenomena in different daily lives.					
Program Learning Outcomes (PLO) Imposed on the Course	<i>PLO 2</i>	Knowledge. Able to explain theoretical concepts and principles of classical and modern physics and able to apply basic concepts of physics and related mathematical methods in finding solutions to physical problems.				
	<i>PLO 5</i>	Long Life Learning. Able to analyze various alternative solutions to physical problems and conclude them for appropriate decision-making, both in familiar and new problems.				
Course Outcomes (CO)	After completing this course, students are expected to be able to:					
	<i>CO1</i>	Students can master the concepts, theories, and laws of physics, especially on electricity, magnetism, electromagnetic waves, optics, and modern physics, then formulate them in mathematical formulas, solving physics problems related to the topics above. [PLO 2, PLO 5].				
	<i>CO2</i>	Students can explain various scientific phenomena in nature and in everyday life related to topics on electricity, magnetism, electromagnetic waves, optics, and modern physics based on the concepts, theories, and laws of physics that have been taught. [PLO 2, PLO 5].				
	<i>CO3</i>	Students can study advanced fields of physics based on the fundamental physics knowledge that has been taught. [PLO 2, PLO 5].				
The Correlation of CO to Learning Materials and Methods, and Time Allocation			Learning Materials	Learning Methods	Time Allocation	
	<i>CO 1, CO 2, CO 3</i>	Electrostatics I (Electric Charge and Coulomb's Law, Electric Field, Gauss's Law, Conductors).		TCL-SCL mixed	<i>3X50 minutes</i>	
	<i>CO 1, CO 2, CO 3</i>	Electrostatics II (Electric Potential, Electric Potential Energy, Capacitance, and Dielectric).		TCL-SCL mixed	<i>3X50 minutes</i>	
	<i>CO 1, CO 2, CO 3</i>	Dynamic electricity (Electric current, Electrical Resistance, Electrical power, Electrical measuring instruments, Kirchhoff's Laws, RC Circuits).		TCL-SCL mixed	<i>3X50 minutes</i>	
<i>CO 1, CO 2, CO 3</i>	Magnetism I (Magnetic Field, Magnetic Force, Biot-Savart Law,		TCL-SCL mixed	<i>3X50 minutes</i>		

		Ampere's Law, Gauss's Law in Magnets, Magnetism in Matter).		
	<i>CO 1, CO 2, CO 3</i>	Magnetism II (Faraday's Law, Lenz's Law, Induction and Inductance, RL and RLC Circuits, Energy in a Magnetic Field, AC Current, Power in AC Circuits).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Maxwell's Equations (Shifting Currents, Maxwell's Equations in Vacuum and Matter).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Electromagnetic Waves (Field Electromagnetic Waves, Electromagnetic Wave Spectrum).	TCL-SCL mixed	<i>3X50 minutes</i>
Midterm exam/Project Task Results/Case Analysis Results				
	<i>CO 1, CO 2, CO 3</i>	Light and Optical Rays (Properties of Light, Speed of Light, Huygens Principle, Dispersion).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Geometric Optics (Snell's Law, Formation of an image by reflection, Formation of an image by refraction, Optical Tools).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Physical Optics (Light as a wave, Light interference, Light diffraction).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Modern Physics I (Galileo's Relativity, Michelson-Morley Experiment, Einstein's Postulates, Lorentz Transformation, Relativistic Momentum and Energy, Mass and Energy).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Modern Physics II (Black Body Radiation, Planck's Quantum Theory, Photoelectric Effect, Compton Effect, Uncertainty Principles, Atomic Models, Lasers, Atomic Nuclei, Radioactivity, Nuclear Reactions).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Modern Physics III (Astrophysics and Cosmology).	TCL-SCL mixed	<i>3X50 minutes</i>
	<i>CO 1, CO 2, CO 3</i>	Modern Physics IV (Electrical properties of solids, Semiconductors, Diodes and Transistors, Superconductors).	TCL-SCL mixed	<i>3X50 minutes</i>
Final exams/ Project Task Results/Case Analysis Results				
Learning Methods	SCL (Student Centered Learning): Project-based learning (Team-based Project)/Case-based learning/PBL/other SCL methods			
Student Learning Experience	Listening, asking, answering questions, and taking notes.			

Access to Learning Media/ LMS and Offline and Online Percentage	Offline (LCD, PPT Slide, Whiteboard, Laptop) and Online (Zoom Meeting, Google Meet, Google Classroom)					
Assessment Methods and Synchronization with CO	Assessment Methods	Assessment Percentage	Criteria/ Indicators	CO1	CO2	CO3
	Participatory Activity*					
	Project Results/ Case Study Results/ PBL Results*					
	Cognitive					
	Assignment	20		√	√	√
	Midterm Exam	30		√	√	√
	Final Exam	30		√	√	√
	Total	100				
	*) can also be obtained from the Midterm or Final Exam as the result of participatory activities or project/ case study results. According to IKU 7, the percentage of project results/ case study/ PBL results is at least 50%.					
References	Main References; <ol style="list-style-type: none"> Halliday, D., Resnick, R and Walker, J., 2014, Fundamental of Physics, Fundamental of Physics Extended, Tenth Edition, John Wiley & Sons, Inc, USA. Tipler, P.A., 2008, Physics for Scientists and Engineers, Sixth edition, W. H. Freeman and Company, New York, USA. Raymond A. Serway, dan John Jewett, 2014, Physics for Scientists and Engineers, Brooks/Cole Cengage Learning, Singapore. 					
Lecturers (Team Teaching)	Dr. Rinto Anugraha NQZ					
Authorization	Date of Drafting	Lecturer Coordinator		Head of Curriculum Committee	Head of Study Program	
		Dr. Rinto Anugraha NQZ			Dr. Eng. Ahmad Kusumaatmaja, S.Si., M.Sc.	