SEMESTER LEARNING ACTIVITY PLANS (SLAP)

SEMESTER EVEN 2022/2023

Physics Undergraduate Study Program

Physics Department

Energy

MFF 3882/ 2 Credits

Lecturer Coordinator:

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UNIVERSITAS GADJAH MADA
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
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	Universitas Gadjah Mada Faculty of Mathematics and Natural Science Physics Department / Physics Undergraduate Study Program Semester EVEN 2022/2023	**Document Number :** ……

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Code	Course Name	Credits (Credits)		Semester	Status	Prerequisite
MFF 3882	*Energy*	*T: 2*	*P: …*	*EVEN*	*Elective*	*Thermodynamics (MFF 1053), Wave (MFF 1405)*

Short Description	The Energy Course is an elective course of 2 Credits in the 2021 Curriculum of the Physics Undergraduate Study Program, Faculty of Mathematics and Natural Sciences UGM. Organizing these courses aims to provide mastery of the basic physics concepts that underlie energy processes. In the 2021 curriculum for the Physics Study Program, these courses are associated with competencies in aspects of knowledge (PLO 2) and aspects of long-life learning/self-development (PLO 5). Learning is carried out based on a face-to-face schedule in class for 14 weeks, with meetings held for 100 minutes each week, interspersed with group assignment presentations. Four weeks during the lecture period are used for Mid-Semester Examinations and Final Semester Examinations, each of which is held on a scheduled basis for two weeks by the Academic Section of FMIPA UGM. Evaluation for students for course assessment is carried out in a summative and formative manner. This is manifested in the form of written exams, both the Mid-Semester Examination and the Final Semester Examination, which take a maximum of 120 minutes. The formative evaluation manifests in the form of independent assignments for each student and group. The form of independent activity is in the form of completing an assignment for students to complete independently at home and by giving presentation assignments. The monitoring process is carried out by looking at student activities during the lecture, such as attendance at lectures, questions and answers and discussion of the material being presented, and student performance in working on independent assignments in the form of homework given.
Program Learning Outcomes (PLO) Imposed on the Course	***PLO 2***	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.
	PLO 5	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:**	
	CO1	Students can explain the concept of physics in the context of energy use and its consequences for the environment
	CO2	Students can explain some examples of energy sources available in the surrounding environment
	CO3	Students can explain the concept of energy conservation techniques by focusing on a physics approach.

The Correlation of CO to Learning Materials and Methods, and Time Allocation		Learning Materials	Learning Methods	Time Allocation
	CO 1	Explanation of RPKPS, introduction to energy in general, and units and scales in energy	TCL-SCL mixed	***2X50 minutes***
	CO 1	Thermal energy, energy in chemical systems, and CO2. flow processes	TCL-SCL mixed	***2X50 minutes***

	CO 1	Entropy and temperature and their application to machines	TCL-SCL mixed	***2X50 minutes***
	CO 2	Natural style; weak interaction and beta decay	TCL-SCL mixed	***2X50 minutes***
	CO 2	Nuclear energy sources: fission and fusion	TCL-SCL mixed	***2X50 minutes***
	CO 2	Energy in the universe; sunlight	TCL-SCL mixed	***2X50 minutes***
	CO 2	Photovoltaic solar cells	TCL-SCL mixed	***2X50 minutes***
	Midterm exam/Project Task Results/Case Analysis Results			
	CO 2	Biological energy: energy from moving water	TCL-SCL mixed	***2X50 minutes***
	CO 3	Energy and Climate	TCL-SCL mixed	***2X50 minutes***
	CO 3	Earth's climate; past, present, and future	TCL-SCL mixed	***4X50 minutes***
	CO 3	Energy efficiency, conservation, and source of energy change	TCL-SCL mixed	***4X50 minutes***
	CO 3	Energy storage and conservation	TCL-SCL mixed	***2X50 minutes***
	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	**Learning to examine and study: an introduction to energy in general as well as units and scales in energy; thermal energy, energy in chemical systems and CO2 flow processes; entropy and temperature and their application to machines, Natural forces; weak interaction and beta decay; Nuclear energy sources: fission and fusion; Energy in the universe; sunlight; autovoltaic solar cells; Biological energy: energy from moving water; Energy and climate; Earth's climate; past, present and future; Energy efficiency, conservation and sources of energy conversion; Energy storage and conservation. In addition, students learn to express opinions and discuss in group presentations in class.**
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	**Assessment Percentage**	**Criteria/ Indicators**	**CO1**	**CO2**	**CO3**
Assessment Methods and Synchronization with CO	**Participatory Activity***					
	Project Results/ Case Study Results/ PBL Results*					
	Cognitive					
	Assignment	**20**		√	√	√
	Midterm Exam	**40**		√	√	
	Final Exam	**40**			√	√

	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;** 1. Robert L Jaffe dan Wangshington Taylor, The physics of energy, Cambridge university press, 2018. 2. Functional Material for Sustainable energy applications, Woodhead publishing, 2012.					
Lecturers (*Team Teaching*)	1. Drs. Wagini, S.U 2. Dr. Sc. Ari Dwi Nugraheni					

Authorization	**Date of Drafting**	**Lecturer Coordinator**	**Head of Curriculum Committee**	**Head of Study Program**
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