SEMESTER LEARNING ACTIVITY PLANS (SLAP)

SEMESTER EVEN 2022/2023

Physics Undergraduate Study Program

Physics Department

Modern Acoustics

MFF 3436/ 2 Credits

Lecturer Coordinator:

Dr. Mitrayana
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UNIVERSITAS GADJAH MADA
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
2022

	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 3436	*Modern Acoustics*	*T: 2*	*P: …*	*EVEN*	*Elective*	*None*

Short Description	The Modern Acoustics course is an elective course for Physics undergraduate study program students, which is held every semester. This course is one of the Courses or Science and Skills courses. The purpose of organizing these courses is to provide students with mastery of the basic concepts regarding the basic concepts of the theory and application of acoustics in the classical and modern eras. The terms classic and modern era are shown through the concept of generation of acoustic phenomena, which in the modern era is characterized by the use of laser sources for an acoustic generation. So that in the 2022 curriculum, the physics undergraduate study program supports PLO 2 (Graduate Learning Outcome 2) and PLO 5 (Graduate Learning Outcome 5). The learning method used is PBL (student-centered), combining a lecture system and class discussion that is prioritized. Learning is carried out based on a face-to-face schedule in class for 14 weeks, with one meeting for 100 minutes each week. 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 Midterm Exaam and Final Exam, which take a maximum of 120 minutes. The formative evaluation is manifested as independent assignments for each student. The form of independent activity is completing an assignment given to students to be discussed in groups and then completed independently at home in the form of a written report for each assignment. The monitoring process is carried out by looking at student activities during the lecture, such as attendance at lectures, questions and answers and discussions on the material being presented, and student performance in carrying out 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 concepts and solve cases of Acoustic wave propagation in various mediums (gas, liquid, and liquid).		
	CO2	Students can explain concepts and solve cases of the working principle of acoustic transducers.		
	CO3	Students can work in groups to study the development of the latest (Modern) Acoustic Theories and Applications.		
The Correlation of CO to Learning Materials and Methods, and Time Allocation		**Learning Materials**	**Learning Methods**	**Time Allocation**
	CO 1	Introduction: Acoustics: The Science of Sound, Sounds We Hear, Sounds We Cannot Hear: Ultrasound and Infrasound, Sounds We Should not Hear.	TCL-PBL mixed	***2X50 minutes***

	CO 1	Environmental Noise Control, Sound Aesthetics: Music, Human Voices: Speech and Singing, How We Hear: Physiological and Psychological Acoustics, Acoustics, Architecture, Harnessing Sound: Physical and Engineering Acoustics, Medical Acoustics, Sounds from the Sea.	TCL-PBL mixed	***2X50 minutes***
	CO 1	Basic linear acoustics: Continuum Mechanics Equations, Linear Acoustic Equations, Variation Formulations, Constant Frequency Waves, Plane Waves,	TCL-PBL mixed	***2X50 minutes***
	CO 1	Sound Attenuation, Acoustic Intensity and Power, Impedance, Reflection and Transmission, Spherical Waves, Cylindrical Waves, Simple Sound Sources, Integral Equations in Acoustics, Waveguides, Channels, and Resonators, Ray Acoustics, Diffraction, Parabolic Equation Methods	TCL-PBL mixed	***2X50 minutes***
	CO 1	Atmospheric Sound Propagation: A Brief History of Outdoor Acoustics, Applications of Outdoor Acoustics, Diffusion Loss, Atmospheric Absorption, Diffraction and Resistance, Soil Effects, Attenuation Through Trees and Foliage, Effects of Wind and Temperature Gradients on Outdoor Sound	TCL-PBL mixed	***2X50 minutes***
	CO 1	Underwater Acoustics: Marine Acoustic Environment, Physical Mechanisms, SONAR and SONAR Equations, Sound Propagation Models, Quantitative Description of Propagation, ONAR Array Processing, Acoustics, and Marine Animals	TCL-PBL mixed	***2X50 minutes***
	CO 2	Physical Acoustics: Theoretical Overview, Physical Acoustic Applications, Equipment, Surface Acoustic Waves, Nonlinear Acoustics	TCL-PBL mixed	***2X50 minutes***
	Midterm exam/Project Task Results/Case Analysis Results			
	CO 2	Thermoacoustics/Photoacoustics: History, Concepts, experimental methods, and their applications	TCL-SCL mixed	***2X50 minutes***

	CO 2, CO 3	Acoustic- Mechanical- Electrical Analogy	TCL-PBL mixed	***2X50 minutes***
	CO 2, CO 3	Microphone	TCL-PBL mixed	***2X50 minutes***
	CO 2, CO 3	Loudspeaker	TCL-PBL mixed	***2X50 minutes***
	CO 2, CO 3	Sound Storage Media	TCL-PBL mixed	***2X50 minutes***
	CO 2, CO 3	Recording Technique	TCL-PBL mixed	***2X50 minutes***
	CO 2, CO 3	Audio signal processing	TCL-PBL 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	**Leadership, collaboration, knowledge, and Presentation techniques**
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	**10**		√	√	√
Quiz	**10**		√	√	√
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. Kinsler, Frey, Copper, Sanders, 2000, Fundamentals of Acoustics, Fourth Edition, John Wiley and Sons New York..
2. Rossing, 2007, Hand Book of Acoustic, Springer Science+Business Media, LLC New York..
3. Morse. P, dan K.U. Ingard 1968. Theoretical Acoustic, Mc Graw Hill..

Lecturers (*Team Teaching*)

1. Dr. Mitrayana
2. Dr. A. Ali Joko Wasono

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