SEMESTER LEARNING ACTIVITY PLANS (SLAP)

SEMESTER ODD 2022/2023

Physics Undergraduate Study Program

Physics Department

Instrumentation System

MFF 2071/ 2 Credits

Lecturer Coordinator:

Prof. Dr. Eng. Kuwat Triyana, M.Si
Prof. Dr. Harsojo, SU., M.Sc

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 ODD 2022/2023	**Document Number :** ……

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Code	Course Name	Credits (Credits)		Semester	Status	Prerequisite
MFF 2071	*Instrumentation System*	*T: 2*	*P: …*	*ODD*	*Elective*	*Electronics (MFF 1850)*

Short Description	The Instrumentation System course is an elective course of 2 credits in the 2021 curriculum for the Bachelor of Physics at Gadjah Mada University, which can be taken in Odd semesters. To be able to take this course, students are recommended to have completed the Electronics course. In the 2021 Curriculum of the Physics Undergraduate Study Program, this course is associated with competencies in the Knowledge Aspect (PLO 2) and the Long Life Learning/Self-Development Aspect (PLO 5).	
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	Knowing and understanding instrumentation systems, types of measuring instruments, and statistical and dynamic characteristics of measuring instruments
	CO2	Know and understand errors during measurements, how to calibrate and measure quality assurance, and first and second-order instruments.
	CO3	Know and understand noise measurement and noise reduction methods
	CO4	Know and understand signal processing, variable conversion elements
	CO5	Know and understand non-destructive testing

		Learning Materials	Learning Methods	Time Allocation
The Correlation of CO to Learning Materials and Methods, and Time Allocation	***CO 1***	Introduction to instrumentation systems	TCL-SCL mixed	***2X50 minutes***
	CO 1	Types of measuring instruments	TCL-SCL mixed	***2X50 minutes***
	CO 1	Statistical characteristics of measuring instruments	TCL-SCL mixed	***2X50 minutes***
	CO 1	Dynamic characteristics of measuring instruments	TCL-SCL mixed	***2X50 minutes***
	CO 2	Error during measurement	TCL-SCL mixed	***2X50 minutes***
	CO 2	Calibration and measurement quality assurance	TCL-SCL mixed	***2X50 minutes***
	CO 2	Measuring instruments of order one and two	TCL-SCL mixed	***2X50 minutes***
	Midterm exam/Project Task Results/Case Analysis Results			
	CO 3	First and second-order measuring instruments	TCL-SCL mixed	***2X50 minutes***

	CO 3	Noise Measurement	TCL-SCL mixed	***2X50 minutes***
	CO 3	Noise Reduction Method	TCL-SCL mixed	***2X50 minutes***
	CO 4	Signal processing	TCL-SCL mixed	***2X50 minutes***
	CO 4	Variable Conversion Element	TCL-SCL mixed	***2X50 minutes***
	CO 4	Introduction to non-destructive testing	TCL-SCL mixed	***2X50 minutes***
	CO 5	Introduction to non-destructive testing	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	**Listen, ask questions, answer questions, discuss, and carry out simulation project assignments**
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	CO4	CO5
Participatory Activity*	**15**		√	√	√	√	√
Project Results/ Case Study Results/ PBL Results*							
Cognitive							
Assignment	**15**		√	√	√	√	√
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;

1. Alan S. Morris, 2001, Measurement and Instrumentation Principles, Butterworth-Heinemann, Oxford .
2. Hebra, A.J., 2010, The Physics of Metrology, Springer-Verlag, Morlenbach, Germany.

Lecturers (*Team Teaching*)

1. Prof. Dr. Eng. Kuwat Triyana, M.Si
2. Prof. Dr. Harsojo, SU., M.Sc

Authorization	**Date of Drafting**	**Lecturer Coordinator**	**Head of Curriculum Committee**	**Head of Study Program**
	2022	*Prof. Dr. Eng. Kuwat Triyana, M.Si*		*Dr. Eng. Ahmad Kusumaatmaja, S.Si., M.Sc.*