SEMESTER LEARNING ACTIVITY PLANS (SLAP)

SEMESTER ODD 2022/2023

Physics Undergraduate Study Program

Physics Department

Nuclear and Particle Detection Method

MFF 3291/ 2 Credits

Lecturer Coordinator:

Prof. Dr. Agung Bambang Setio Utomo, S.U.

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 :** ……

SEMESTER LEARNING ACTIVITY PLANS (SLAP)

Code	Course Name	Credits (Credits)		Semester	Status	Prerequisite
MFF 3291	*Nuclear and Particle Detection Method*	*T: 2*	*P: …*	*ODD*	*Elective*	*Atomic and Molecular Detection Method (MFF 2322)*

Short Description	The Nuclear and Particle Detection Method course is an elective subject of interest in the Physics study program, Physics Department, FMIPA-UGM. This course will provide material on the basics of radiation interaction with material which will be very useful in understanding the mechanisms that occur in nuclear radiation detectors. Besides that, the material on the detection process using nuclear detectors, including the necessary auxiliary equipment, is also given, up to the results of the data/spectrum graphs obtained. The spectrum analysis obtained is then analyzed to provide information on the occurring interactions. In addition, detection applications involving nuclear interactions are provided. With good mastery of the material in this course and supported by core practicum courses, it will undoubtedly improve the students' attitudes to increase their value in entering the world of work. This course has a very strategic position because it requires an understanding of several other subjects such as Physics Measurement Methods, Modern Physics, Core Physics, and others, as well as being a support for subsequent courses, especially subjects involving nuclear radiation interactions and students' Final Projects concerning nuclear radiation.	
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	Understand the mechanism of nuclear radiation interaction with matter (especially detectors) so that students can use nuclear detection equipment, electronic auxiliary equipment, and their use
	CO2	Having an adequate understanding of the manufacture and design of nuclear radiation detection systems for applications and analysis involving nuclear radiation
	CO3	Increase cooperation in groups and the ability to convey ideas or thoughts, as well as improve the ability to think logically and creatively, which will indirectly foster leadership through group work.
	CO4	Have skills in obtaining lecture materials both from materials provided by lecturers and other materials by searching through books and the internet

The Correlation of CO to Learning Materials and		**Learning Materials**	**Learning Methods**	**Time Allocation**
	CO1, CO3, CO4	Introduction: Lecture game rules, assessment rules, Material (Syllabus)	TCL-SCL mixed	***2X50 minutes***

Methods, and Time Allocation	***CO1, CO3, CO4***	Fundamentals of radiation-matter interactions in general	TCL-SCL mixed	***4X50 minutes***
	CO1, CO3, CO4	Mechanism of a reaction in gas cylinder detectors, scintillators, semiconductors, and high-energy radiation detection	TCL-SCL mixed	***4X50 minutes***
	CO1, CO3, CO4	Mechanisms and functions of nuclear electronic auxiliary equipment	TCL-SCL mixed	***4X50 minutes***
	Midterm exam/Project Task Results/Case Analysis Results			
	CO1, CO3, CO4	Nuclear detection circuit/system	TCL-SCL mixed	***2X50 minutes***
	CO 2, CO 3, CO 4		TCL-SCL mixed	***2X50 minutes***
	CO 2, CO 3, CO 4	Dosimetry	TCL-SCL mixed	***2X50 minutes***
	CO 2, CO 3, CO 4	Nuclear Spectroscopy: Gamma, X-ray, NMR.	TCL-SCL mixed	***2X50 minutes***
	CO 2, CO 3, CO 4		TCL-SCL mixed	***2X50 minutes***
	CO 2, CO 3, CO 4	Spectrum analysis.	TCL-SCL mixed	***2X50 minutes***
	CO 2, CO 3, CO 4	Radiation application nuclear: Activation neutrons.	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, answer questions and discuss**			
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**
	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. Tsoulfanidis N, 1983, Measurement and detection of radiation, Mc Graw Hill .
Lecturers (*Team Teaching*)	1. Prof. Dr. Agung Bambang Setio Utomo, S.U.

Authorization	**Date of Drafting**	**Lecturer Coordinator**	**Head of Curriculum Committee**	**Head of Study Program**
		Prof. Dr. Agung Bambang Setio Utomo, S.U.		*Dr. Eng. Ahmad Kusumaatmaja, S.Si., M.Sc.*