

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



Physics Undergraduate Study Program

Physics Department

Microwave

MFF 3843/ 2 Credits

Lecturer Coordinator:

Dr. Mitrayana, S.Si., M.Si.

**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  
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Document Number :

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### SEMESTER LEARNING ACTIVITY PLANS (SLAP)

Code	Course Name	Credits (Credits)		Semester	Status	Prerequisite
<i>MFF 3843</i>	<i>Microwave</i>	<i>T: 2</i>	<i>P: ...</i>	<i>ODD</i>	<i>Elective</i>	<i>Electromagnetics I (MFF 2415), Mathematical Physics III (MFF 2024)I</i>
<b>Short Description</b>	<p>The Microwaves (Courses) course is an elective for Odd semester Physics Study Program students. This course is one of the Courses K types of Science and Skills courses. The purpose of this event is to provide students with mastery of fundamental concepts regarding working principles and to support equipment as well as the application of Microwave systems/equipment; furthermore, it will also explain the application of Microwaves in several fields of science and technology, especially in the fields of defense, security, food, and health. So that in the 2021 curriculum, the Physics study program supports PLO 2 (Knowledge Aspect) and PLO 5 (Long Life Learning/Self Development Aspect).</p>					
<b>Program Learning Outcomes (PLO) Imposed on the Course</b>	<i>PLO 2</i>	<b>Knowledge.</b> 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>	<b>Long Life Learning.</b> Able to analyze various alternative solutions to physical problems and conclude them for appropriate decision-making, both in familiar and new problems.				
<b>Course Outcomes (CO)</b>	<b>After completing this course, students are expected to be able to:</b>					
	<i>CO1</i>	Students can explain microwave propagation in various waveguide models.				
	<i>CO2</i>	Students can understand the working principles of control components and microwave generator sources.				
	<i>CO3</i>	Students can explain the application of microwaves in ESR, Radar, Communication Systems, and Tomographic Thermoacoustic Systems.				
<b>The Correlation of CO to Learning Materials and Methods, and Time Allocation</b>	<b>Learning Materials</b>			<b>Learning Methods</b>		<b>Time Allocation</b>
	<i>CO 1</i>	Introduction: Lecture Contract, Survey of Microwave (GM) equipment and systems, the relationship of gm WITH OTHER ELECTRONIC EQUIPMENT, gm SYSTEM, gm spectrum, why GM equipment is needed, the basic design of GM system		TCL-SCL mixed		<i>2X50 minutes</i>
	<i>CO 1</i>	GM transmission forms, signal control components, semiconductor amplifiers and insulators, GM tubes, GM weak sound receivers, GM antennas		TCL-SCL mixed		<i>2X50 minutes</i>
	<i>CO 1</i>	Microwave Field		TCL-SCL mixed		<i>2X50 minutes</i>
	<i>CO 1</i>	Wave Guide		TCL-SCL mixed		<i>2X50 minutes</i>

	<b>CO 1</b>	Insertion Loss, Gain, and Return Loss		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 1</b>	Adjustment to the Smith Chart		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 2</b>	Microwave Transmission Line		TCL-SCL mixed		<i>2X50 minutes</i>	
<b>Midterm exam/Project Task Results/Case Analysis Results</b>							
	<b>CO 2</b>	Microwave Signal Control Components		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 2</b>	Microwave Equipment		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 2</b>	Microwave Application 1: Electron Spin Resonance		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 3</b>	Microwave App 2: Radar		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 3</b>	Microwave App 3: Communication with Microwaves		TCL-SCL mixed		<i>2X50 minutes</i>	
	<b>CO 3</b>	Microwave Application 4: Thermoacoustic Tomography (TAT)		TCL-SCL mixed		<i>4X50 minutes</i>	
<b>Final exams/ Project Task Results/Case Analysis Results</b>							
<b>Learning Methods</b>	<b>SCL (Student Centered Learning): Project-based learning (Team-based Project)/Case-based learning/PBL/other SCL methods</b>						
<b>Student Learning Experience</b>	<b>Learn to Examine and study Microwave systems, Presentation of papers</b>						
<b>Access to Learning Media/ LMS and Offline and Online Percentage</b>	Offline (LCD, PPT Slide, Whiteboard, Laptop) and Online (Zoom Meeting, Google Meet, Google Classroom)						
<b>Assessment Methods and Synchronization with CO</b>	<b>Assessment Methods</b>	<b>Assessment Percentage</b>	<b>Criteria/ Indicators</b>	<b>CO1</b>	<b>CO2</b>	<b>CO3</b>	
	<b>Participatory Activity*</b>						
	<b>Project Results/ Case Study Results/ PBL Results*</b>						
	<b>Cognitive</b>						
	<b>Group Assignment</b>	<b>40</b>					√
	<b>Midterm Exam</b>	<b>30</b>			√		
	<b>Final Exam</b>	<b>30</b>				√	
	<b>Total</b>	<b>100</b>					
*) 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%.							

<b>References</b>	<b>Main References;</b> <ol style="list-style-type: none"> <li>1. Allan W. Scott, 1993, Understanding Microwaves, John Wiley &amp; Sons..</li> <li>2. Mike Golio, 2008, RF and Microwave Applications and Systems..</li> <li>3. Mitrayana, 2016, Gelombang Mikro Teori dan Aplikasi, Gadjah Mada Press..</li> </ol>			
<b>Lecturers (Team Teaching)</b>	<ol style="list-style-type: none"> <li>1. Dr. Mitrayana, S.Si., M.Si.</li> </ol>			
<b>Authorization</b>	<b>Date of Drafting</b>	<b>Lecturer Coordinator</b>	<b>Head of Curriculum Committee</b>	<b>Head of Study Program</b>
		<i>Dr. Mitrayana, S.Si., M.Si.</i>		<i>Dr. Eng. Ahmad Kusumaatmaja, S.Si., M.Sc.</i>