SEMESTER LEARNING ACTIVITY PLANS (SLAP)

SEMESTER ODD 2022/2023

Physics Undergraduate Study Program

Physics Department

Solid State Physics II

MFF 3608/ 2 Credits

Lecturer Coordinator:

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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 3608	*Solid State Physics II*	*T: 2*	*P: …*	*ODD*	*Compulsory*	*Solid State Physics I (MFF2601)*

Short Description	Solid State Physics II course (MFF 3608) is a compulsory course in the 2016 Curriculum of the FMIPA UGM Physics Study Program and part of a series of lectures on solid-state physics. Previously, students were required to take Courses Solid State Physics I (MFF 3601) as a prerequisite. Because it is a continuation of Courses I, the topics that will be presented are advanced study topics, which involve unique characteristics of materials such as magnetic, optical, and superconductivity characteristics. In addition, several study topics involving the latest technological developments, such as surfaces and interfaces, will also be discussed in this lecture. To support student understanding of the material to be discussed, student knowledge of quantum mechanics is needed. Given the microscopic depiction of material systems, much will be done to understand the microscopic characteristics of the material. To assist students in understanding the topic of study in this lecture, the process of deepening the lecture material is also often added with visual depictions to reduce the difficulty of abstraction in understanding the lecture material. In addition, the learning process is periodically complemented by providing assignments or homework or assignments to students to improve problem-solving skills and understanding of course material. Learning is carried out based on a face-to-face schedule in class for 14 weeks, with each week consisting of 100 minutes. 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 summatively and formatively. 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 is realized through 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 have the ability in Physics Skills, namely how to formulate and describe (to describe) the physical phenomena being studied and uncover

		important information contained in the physics problem through various tricks or certain mathematical procedures and utilizing various approximations.		
	CO2	Students have the ability in Analytical Skills, namely how to pay attention to physics problems in detail, analyze problems and build arguments logically and carefully.		
	CO3	Students have the ability in Investigative Skills, namely how to search for physics problems from various sources and references to understand important information.		
	CO4	Students have the ability in Problem-Solving Skills, namely how to solve a problem with a structured solution (well-defined solutions), formulate a problem carefully, and try other approaches (approaches) to improve solving a challenging problem (challenging problems).		
The Correlation of CO to Learning Materials and Methods, and Time Allocation		**Learning Materials**	**Learning Methods**	**Time Allocation**
	CO 1, CO 2, CO 3, CO 4	Magnetic properties of materials: Diamagnets, Paramagnets, ferromagnets, antiferromagnets, and ferrimagnets	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Magnetic properties of materials: Diamagnets, Paramagnets, ferromagnets, antiferromagnets, and ferrimagnets	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Magnetic properties of materials: Diamagnets, Paramagnets, ferromagnets, antiferromagnets, and ferrimagnets	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Dielectric Properties: polarizability, dielectric constant, ferroelectricity, piezo-electricity.	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Dielectric Characteristics: polarizability, dielectric constant, ferroelectricity, piezo-electricity.	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Elementary excitation: Plasmon, polariton, polaron	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Elementary excitation: Plasmon, polariton, polaron	TCL-SCL mixed	***2X50 minutes***
	Midterm exam/Project Task Results/Case Analysis Results			
	CO 1, CO 2, CO 3, CO 4	Superconductivity: perfect diamagnetism, super current and penetration depth, required field and temperature, type I and typed II superconductors, thermodynamic and optical properties.	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Superconductivity: perfect diamagnetism, super current and depth of penetration, critical field and temperature, type I and type II superconductors, thermodynamic and optical properties.	TCL-SCL mixed	***2X50 minutes***

	CO 1, CO 2, CO 3, CO 4	Superconductivity: perfect diamagnetism, super current and penetration depth, required field and temperature, type I and typed II superconductors, thermodynamic and optical properties.	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	The Phenomenon of Magnetic Resonance	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	The Phenomenon of Magnetic Resonance	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Physical phenomena in surface systems, interfaces, and nanostructures.	TCL-SCL mixed	***2X50 minutes***
	CO 1, CO 2, CO 3, CO 4	Physical phenomena in surface systems, interfaces, and nanostructures.	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	**Learn to examine and study physical systems as well as examples of problem-solving procedures**
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	**40**		√	√	√	√
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%.

<table>
<tr><td>References</td><td colspan="4">Main References;
1. C..Kittel, Solid State Physic, Edisi 8, 2005..
2. R.K. Puri , V.K. Babbar, 1997, Solid State Physic, S. Chand & Company LTD, New Delhi.</td></tr>
<tr><td>Lecturers (Team Teaching)</td><td colspan="4">1. Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D
2. Prof., Dr. Harsojo, SU, M.Sc.</td></tr>
<tr><td rowspan="2">Authorization</td><td>Date of Drafting</td><td>Lecturer Coordinator</td><td>Head of Curriculum Committee</td><td>Head of Study Program</td></tr>
<tr><td></td><td>Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D</td><td></td><td>Dr. Eng. Ahmad Kusumaatmaja, S.Si., M.Sc.</td></tr>
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