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

Condensed Matter Physics

MFF5701 / 3 Credits

Lecturer Coordinator:

Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.

UNIVERSITAS GADJAH MADA
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
2022

Universitas Gadjah Mada
Faculty of Mathematics and Natural Science
Physics Department / Study Program Master Physics
Semester Odd 2022/2023

SEMESTER LEARNING ACTIVITY PLANS (SLAP)

Code	Course Name	Credits (credits)	Semester	Status	Prerequisite
MFF5701	*Condesed Matter Physics*	*3*	*Odd*	*Elective*	*None*

Short Description

Condesed Matter Physics course is Elective course 3 credits (Theory) in the 2022 Curriculum Master Physics Study Program, Faculty of Mathematics and Natural Science UGM.

The syllabus of this course is as follows:
A summary of the basic concepts of quantum mechanics and quantum statistics in a system of compressed substances. Fundamental topics in FZM: bonding in atoms, molecules, and compressive substances; energy and potential; the structure of the compressed substance; electronic structure of the compressed substance; mean-field theory; critical phenomena; elementary excitation in compressed substances is associated with the thermal and electromagnetic properties of compressed substances, the topology character of the material, superconductivity.

The courses are held in class for 14 weeks, each week's session last for 3 x 50 minutes. Four weeks of course period is used for Midterm Exam and Final Exam, each held for two weeks as scheduled.

Student evaluation for course assessments is performed summative and formative. The summative evaluation is implemented as written exams, both Midterm and Final Exam, which take a maximum of 120 minutes. The formative evaluation is implemented as individual assignments for each student in the form of completing an assignment individually. Monitoring is carried out by observing student activities during the course, such as attendance, Q&A and discussion about the material presented, and student performance in completing individual assignments.

Program Learning Outcomes (PLO) Imposed on the Course

PLO 3	Mastering further knowledge of classical and modern physics theory, and its relationship with other disciplines, and has mastered an advanced field of physics specialization that allows him to keep up with the latest international research developments.
PLO 4	Mastering various mathematical disciplines related to an advanced field of physics, and able to develop physical models using various mathematical and computational tools with an inter or multidisciplinary approach to solving problems related to an advanced field of physics.
PLO 6	Able to apply knowledge to analyze, synthesize, formulate problems and solve problems comprehensively in one of advanced field of physics, through experimental or theoretical research, then be able to classify and draw conclusions about their findings for the development of science and technology.

Course Outcomes (CO)	**Upon completion of this course, students should be able to:**			
	CO1	Formulate and describe (to describe) the symptoms of physics that are being studied and reveal important information contained in the physics problem through various tricks or specific mathematical procedures and utilize various approach steps (approximations).		
	CO2	Pay attention to physics problems in detail(), analyze problems and build arguments logically and carefully.		
	CO3	Tracing physics problems from various sources and references to gain understanding for important information.		
	CO4	Solving a problem with well-defined solutions, formulating a problem carefully and trying other approaches in an effort to improve the solution of a challenging problem.		
	CO5			
	CO6			
	CO7			
	CO8			
The Correlation of CO to Learning Materials and Methods, and Time Allocation		**Learning Materials**	**Learning Methods**	**Time Allocation**
	CO1	Introduction: Summary of basic concepts of Quantum Mechanics	Lecture	3 x 50 minutes
	CO1	Introduction: Summary of the basic concepts of quantum statistics.	Lecture	3 x 50 minutes
	CO1	Structure of incompressible substances: Bonding in atoms and molecules.	Lecture	3 x 50 minutes
	CO2	Structure of incompressible: Bonding in incompressible; energy and potential, structure of incompressible (part I).	Lecture	3 x 50 minutes
	CO2	Structure of incompressible: Bonding in incompressible; energy and potential, structure of incompressible substances (part II).	Lecture	3 x 50 minutes
	CO2	Electronic structure of incompressible substances (part I).	Lecture	3 x 50 minutes
	CO2	Electronic structure of incompressible substances (part II).	Lecture	3 x 50 minutes
	CO3	Review: The electronic structure of incompressible substances.	Lecture	3 x 50 minutes
	CO3	Concepts of phase transitions in incompressible substances: mean field theory (Part I).	Lecture	3 x 50 minutes
	CO3	Concepts of phase transitions in incompressible substances: mean field theory (part II).	Lecture	3 x 50 minutes
	CO4	Concepts of phase transitions in incompressible substances: critical phenomena.	Lecture	3 x 50 minutes

	CO4	Elementary excitation in incompressible substances is associated with the thermal and electromagnetic properties of incompressible substances (Part I).	Lecture	3 x 50 minutes
	CO4	Elementary excitation in incompressible substances is associated with the thermal and electromagnetic properties of incompressible substances (Section II).	Lecture	3 x 50 minutes
	CO4	Elementary excitation in incompressible substances is associated with the thermal and electromagnetic properties of incompressible substances (Part III).	Lecture	3 x 50 minutes
	Final Exam/ Project Task Results/ Case Analysis Results			
Learning Methods	Lecture			
Student Learning Experience	Learn to analyze and review: Introduction: Summary of basic concepts of Quantum Mechanics, Introduction: Summary of the basic concepts of quantum statistics., Structure of incompressible substances: Bonding in atoms and molecules., Structure of incompressible: Bonding in incompressible; energy and potential, structure of incompressible (part I)., Structure of incompressible: Bonding in incompressible; energy and potential, structure of incompressible substances (part II)., Electronic structure of incompressible substances (part I)., Electronic structure of incompressible substances (part II)., Review: The electronic structure of incompressible substances., Concepts of phase transitions in incompressible substances: mean field theory (Part I)., Concepts of phase transitions in incompressible substances: mean field theory (part II)., Concepts of phase transitions in incompressible substances: critical phenomena., Elementary excitation in incompressible substances is associated with the thermal and electromagnetic properties of incompressible substances (Part I)., Elementary excitation in incompressible substances is associated with the thermal and electromagnetic properties of incompressible substances (Section II)., Elementary excitation in incompressible substances is associated with the thermal and electromagnetic properties of incompressible substances (Part III)..			
Access to Learning Media/ LMS and Offline and Online Percentage	Sync (google meet), Asynchronous (google classroom, video)			
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	30%		7,5%	7,5%	7,5%	7,5%

	Quiz						
	Midterm Exam	35%		17,5%	17,5%		
	Final Exam	35%				17,5%	17,5%
	*) 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. P M Chaikin, T C Lubensky, 1995, Principles of Condensed Matter Physics, Cambridge University Press, Cambridge, UK. 2. Feng Duan, Jin Guojun 2005, Introduction to Condensed Matter Physics,World Scientific Publishing Co., Singapore. 3. Michael P Marder, 2010, Condensed Matter Physics, second edition, JohnWiley & Sons, New Jersey, USA.
Lecturers (*Team Teaching*)	1. Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D. 2. Dr. Chotimah, M.Si. 3. 4.

Authorization	**Date of Drafting**	**Lecturer Coordinator**	**Head of Curriculum Committee**	**Head of Study Program**
		Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.	Dr.Ing. Ari Setiawan	Mirza Satriawan, M.Si., Ph.D