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

Soft Condensed Matter Physics

MFF5601 / 3 Credits

Lecturer Coordinator:

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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
MFF5601	*Soft Condensed Matter Physics*	*3*	*Odd*	*Elective*	*None*

Short Description

Soft Condensed 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:
Introduction to the physics of soft compressed materials, phases and structures of liquid crystals. Physical and chemical properties of liquid crystals. An explanation of the types of liquid crystals. The optical and electrical effects of liquid crystals. Application of liquid crystal technology in everyday life. Introduction to polymers and properties of polymer molecules, The concept of ideal chains, the distribution of segments on polymers, radius of gyration, non-ideal chains, effects of solvent, thermodynamic properties of polymer solution and application of polymers in everyday life.

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	Understand Fundamental Materials, Basic of Liquid Crystals, Surface Anchoring, Alignment, Confinement.		
	CO2	Understand Elastic Properties, Freedericksz Transitions, Optical Properties.		
	CO3	Understand Liquid Crystal Elastomers.		
	CO4	Understand the basic concepts of polymers and their classification.		
	CO5	Understand various techniques in polymerization, their characterization (morphology and structure), mechanical and rheological properties.		
	CO6			
	CO7			
	CO8			
The Correlation of CO to Learning Materials and Methods, and Time Allocation		**Learning Materials**	**Learning Methods**	**Time Allocation**
	CO1	Material Fundamental	Lecture, discussion	3 x 50 minutes
	CO1	Basic of Liquid Crystals	Lecture, discussion	3 x 50 minutes
	CO1	Surface Anchoring, Alignment, Confinement	Lecture, discussion	3 x 50 minutes
	CO2	Elastic Properties	Lecture, discussion	3 x 50 minutes
	CO2	Freedericksz Transitions	Lecture, discussion	3 x 50 minutes
	CO2	Optical Properties	Lecture, discussion	3 x 50 minutes
	CO2	Liquid Crystal Elastomer	Lecture, discussion	3 x 50 minutes
	CO3		Lecture, discussion	3 x 50 minutes
	CO3		Lecture, discussion	3 x 50 minutes
	CO3		Lecture, discussion	3 x 50 minutes
	CO4		Lecture, discussion	3 x 50 minutes
	CO4		Lecture, discussion	3 x 50 minutes
	CO4		Lecture, discussion	3 x 50 minutes
	CO4		Lecture, discussion	3 x 50 minutes
	Final Exam/ Project Task Results/ Case Analysis Results			

Learning Methods	Lecture, discussion
Student Learning Experience	Learn to analyze and review: Material Fundamental, Basic of Liquid Crystals, Surface Anchoring, Alignment, Confinement, Elastic Properties, Freedericksz Transitions, Optical Properties, Liquid Crystal Elastomer, , , , , , , .
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. S. Chandrasekhar, Liquid Crystals, 2nd Edition, Cambridge UniversityPress, Cambridge, 1977. 2. P. G. de Gennes and J. Prost, The Physics of Liquid Crystals, OxfordScience Publications, (993. 3. M. Doi, Introduction to Polymer Physics, Oxford University Press, Oxford, 1997. 4. M. Doi and S. F. Edwards, The Theory of Polymer Dynamics, Oxford University Press, Oxford. 5. Warner and E. M. Terentjev, Liquid Crystal Elastomers, Oxford University Press, Oxford, 2003.
Lecturers (*Team Teaching*)	1. Prof. Yusril Yusuf, S.Si., M.Si., M.Eng., D.Eng., Ph.D. 2. Dr.Eng. Ahmad Kusumaatmaja, S.Si., M.Sc. 3. 4.

Authorization	**Date of Drafting**	**Lecturer Coordinator**	**Head of Curriculum Committee**	**Head of Study Program**
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