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

Advanced Continuum Mechanics

MFF5831 / 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
MFF5831	*Advanced Continuum Mechanics*	*3*	*Odd*	*Elective*	*None*

Short Description

Advanced Continuous Medium Mechanics 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:
The principles of stress, deformation, and motion, fundamental laws and equations in mechanics, dynamics of linear elastic solids, classical fluids, fluid dynamics in geophysics, computational mechanics of continuous mediums, and nonlinearity of earth materials.

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.

Upon completion of this course, students should be able to:

CO1	Understand the basic concepts of the strain–stress relationship.

Course Outcomes (CO)	***CO2***	Understand the deformation concept in an object that experiences strain stress in 3D space and in time change variables.		
	CO3	Understand the concepts of conservation of mass, momentum, and energy.		
	CO4	Understand the concept of Newtonian and Non-Newtonian fluid flow, both compressible and incompressible.		
	CO5	Understand the concepts of linear and non-linear elasticity in a fluid flow.		
	CO6			
	CO7			
	CO8			
The Correlation of CO to Learning Materials and Methods, and Time Allocation		**Learning Materials**	**Learning Methods**	**Time Allocation**
	CO1	Understanding tensor order 0 to order tensor 2.	Lecture, discussion	3 x 50 minutes
	CO1	Fundamentals of mathematics, physics, algebra, strain stress (integral and derivative concepts).	Lecture, discussion	3 x 50 minutes
	CO1	Stress and strain	Lecture, discussion	3 x 50 minutes
	CO2	Stress and Strain II	Lecture, discussion	3 x 50 minutes
	CO2	Deformation, strain and stress meeting I.	Lecture, discussion	3 x 50 minutes
	CO2	Deformation, strain and stress confluence II.	Lecture, discussion	3 x 50 minutes
	CO2	Deformation, strain and stress meeting III.	Lecture, discussion	3 x 50 minutes
	CO3	Conservation of Mass.	Lecture, discussion	3 x 50 minutes
	CO3	Reynolds Transport Theorem.	Lecture, discussion	3 x 50 minutes
	CO3	Conservation of Energy.	Lecture, discussion	3 x 50 minutes
	CO4	Conservation of Momentum.	Lecture, discussion	3 x 50 minutes
	CO4	Newtonian and non-newtonian fluid flows I.	Lecture, discussion	3 x 50 minutes
	CO4	Newtonian and non-Newtonian fluid flows II.	Lecture, discussion	3 x 50 minutes
	CO4	Linear and non-linear elasticity.	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: Understanding tensor order 0 to order tensor 2., Fundamentals of mathematics, physics, algebra, strain stress (integral and derivative concepts)., Stress and strain, Stress and Strain II, Deformation, strain and stress meeting I., Deformation, strain and stress confluence II., Deformation, strain and stress meeting III., Conservation of Mass.,			

	Reynolds Transport Theorem., Conservation of Energy., Conservation of Momentum., Newtonian and non-newtonian fluid flows I., Newtonian and non-Newtonian fluid flows II., Linear and non-linear elasticity..
Access to Learning Media/ LMS and Offline and Online Percentage	Powerpoint
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. W WILLIAM I. NEWMAN, 2012, continuum mechanics in the earth sciences. 2. A.B Bathia dan R.N. Singh, 1978, Mechanics of Deformable Media. 3. George E. Mase, 1970, Schaum's Outline of Continuum Mechanics.
Lecturers (*Team Teaching*)	1. Dr. Sudarmaji, M.Si. 2. Dr.rer.nat. Herlan Darmawan, M.Sc. 3. 4.

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