	Universitas Negeri Surabaya Faculty of Engineering, Mechanical Engineering Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Fluid Mechanics	8320302213		T=2	P=0	ECTS=3.18	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Ir. Wahyu Dwi Kurniawan, S.Pd., M.Pd.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Fluid Mechanics (Basic): is a mandatory course that studies the behavior of fluids at rest or in motion without paying attention to the causes of fluid motion. The science of fluid mechanics is the main key in mechanical engineering, therefore its status in the curriculum is a mandatory course for Mechanical Engineering students. In the study of Mechanical Engineering, this course is very helpful in the basics of planning design, design of machines, airplanes, ships as well as supporting problem solving analysis of thermodynamics, heat transfer and combustion theory courses, especially those related to the conservation and exploitation of energy sources . This course is mainly based on the Physics course which is mostly related to natural sciences. In the Fluid Mechanics 1 course, the basic concepts of fluid mechanics will be discussed, including fluid properties, the forces that occur in static and dynamic fluids. After taking this course, students are expected to understand the concepts of fluid mechanics and their interrelationships and be able to apply them to the field of Mechanical Engineering.
References	**Main :**

1. Introduction To Fluid Mechanics, Robert W Fox., Alant. MC Donald
2. Mekanika Fluida I & II Frank M white.
3. Succter V.L. Mekanika Fluida. Erlangga: Jakarta.
4. Shannes L.H. Mechanics of Fluids, Mc Graw-Hill, New York
5. Merle .C. Potter, David C. Wiggret. Schaums Outline Mekanika fluida. Erlangga: Jakarta.

Supporters:	
Supporting lecturer	Prof. Dr. Ir. I Wayan Susila, M.T. Dr. A. Grummy Wailanduw, M.Pd., M.T. Ir. Priyo Heru Adiwibowo, S.T., M.T. Bima Anggana Widhiarta Putra, S.Pd., M.Pd.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Formulate fluid properties	1.1 Able to understand and explain the physical meaning of dimensions, units and physical quantities 1.2 Able to convert one quantity and unit to another, practice questions. 2.1 Able to analyze and calculate fluid properties and their relationship to thermodynamics, practice questions	**Criteria:** According to the scoring guidelines and presentation rubric, full marks are obtained if you do all the questions correctly.	Reading literature and listening to students' explanations Reading literature, counting case examples, peer discussion, and Q&A Reading literature, counting case examples, peer discussion, and Q&A 10 X 30			0%
2							0%
3	Understand and analyze fundamental concepts of fluid mechanics related to fluid properties and their influence on fluid mechanics applications	3.1 Able to understand the basic concept of fluid as a continuum 3.2 Able to explain and analyze velocity profiles in steady, unsteady fluids, as well as velocity profiles in fluids in 1D, 2D and 3D flow	**Criteria:** According to the scoring guidelines and presentation rubric, full marks are obtained if you do all the questions correctly.	Reading literature and listening to students' explanations Reading literature and listening to students' explanations 3 X 50			0%
4	Students can explain the basic concepts of velocity fields, stress fields, viscosity, surface tension, description and classification of fluid movements	Can explain the concepts of velocity fields, stress, viscosity, surface tension, and description and classification of fluid movements	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
5	Students can explain the basic concepts of velocity fields, stress fields, viscosity, surface tension, description and classification of fluid movements	Can explain the concepts of velocity fields, stress, viscosity, surface tension, and description and classification of fluid movements	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
6	Students can explain the basic concepts of velocity fields, stress fields, viscosity, surface tension, description and classification of fluid movements	Can explain the concepts of velocity fields, stress, viscosity, surface tension, and description and classification of fluid movements	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
7	Students can apply static fluid equations and calculate hydrostatic forces on immersed surfaces	Can apply static fluid equations and calculate hydrostatic forces	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
8	Students are able to apply basic equations in solving problems	Able to apply basic equations in solving problems	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Test work on 3 X 50 questions			0%

9	Students can apply static fluid equations and calculate hydrostatic forces on immersed surfaces	Can apply static fluid equations and calculate hydrostatic forces	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
10	Students can apply static fluid equations and calculate hydrostatic forces on immersed surfaces	Can apply static fluid equations and calculate hydrostatic forces	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
11	Students can apply the basic conservation of mass equations and the equations of motion/momentum in solving related problems	Can apply basic mass conservation equations and motion/momentum equations	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
12	Students can apply the basic conservation of mass equations and the equations of motion/momentum in solving related problems	Can apply basic mass conservation equations and motion/momentum equations	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
13	Students can apply the basic conservation of mass equations and the equations of motion/momentum in solving related problems	Can apply basic mass conservation equations and motion/momentum equations	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
14	Students can apply the basic conservation of mass equations and the equations of motion/momentum in solving related problems	Can apply basic mass conservation equations and motion/momentum equations	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
15	Students can apply dimensional and similarity analysis to form dimensionless equations	Can apply dimensional and similarity analysis	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%
16	Students can apply dimensional and similarity analysis to form dimensionless equations	Can apply dimensional and similarity analysis	**Criteria:** Steps for working on questions Completeness of work: Drawings/schemes, basic formulas, assumptions, inclusion of units Final Results	Lectures, questions and answers, discussions and practice questions on 3 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.