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

SEMESTER LEARNING PLAN

Courses		CODE		Course Family		Credit Weight			SEMESTER	Compilation Date
Thermodynamics I		2120103098				T=3	P=0	ECTS=4.77	3	July 18, 2024

AUTHORIZATION		SP Developer		Course Cluster Coordinator		Study Program Coordinator
		....		....		Ir. Priyo Heru Adiwibowo, S.T., M.T.

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	This course is an understanding of the concept of the First Law of Thermodynamics regarding the conservation of energy and the concept of control mass and control volume systems. The discussion begins with an introduction to SI and British unit conversions, the concept of work and energy in thermodynamics, and energy balance in closed systems. Then the discussion is deepened for control mass systems with an introduction to thermodynamic properties related to control mass systems, namely pressure, temperature, specific volume and specific internal energy. The discussion of control mass systems is further deepened with the introduction of the ideal gas model for fluids in the gas phase. The next discussion is evaluating control volume systems such as nozzles, diffusers, turbines, compressors, pumps and introducing fluid properties related to control volume systems, namely enthalpy.

References	**Main :**
	1. 1] Moran, Michael J., Howard N. Saphiro, Daisie D. Boettner, and Margareth B. Bailey, 2011, Fundamentals of Engineering Thermodynamics 7th ed., John Wiley & Sons. 2. [2] Reynold, William C. and Perkin Henry C., 1977, Engineering Thermodynamics 2nd ed., McGraw-Hill. 3. [3] Holman, 1980, Thermodynamics, 3rd ed., McGraw-Hill. 4. [4] Kogakusha, Wood and Bernard D., 1982, Applications of Thermodynamics 2nd ed., Addison-Wesley.
	Supporters:

Supporting lecturer	Prof. Dr. Muhaji, S.T., M.T. Dr. Mohammad Effendy, S.T., M.T. Dr. Aris Ansori, S.Pd., M.T. Ika Nurjannah, S.Pd., M.T.

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	Get to know the SI and British unit systems and their quantity conversions	Students are able to convert quantities in SI and British units	**Criteria:** according to the rubric	Lectures, discussions and questions and answers 3 X 50			0%
2	Understand the principles of conservation of mechanical and thermodynamic energy	Students understand the principles of work and energy balance	**Criteria:** according to the rubric	Lectures, discussions, questions and answers, exercises and assignments 6 X 50			0%
3							0%
4	Short Quiz I	Short Quiz I	**Criteria:** according to the rubric	Short Quiz I 3 X 50			0%
5	Understand control mass systems, fluid properties, fluid states, isobar, isovolume, and polytropic processes	Students are able to understand control mass systems, isobar and isovolume processes	**Criteria:** according to the rubric	Lectures, discussions, questions and answers, exercises and assignments 9 X 50			0%
6							0%
7							0%
8	Short Quiz II	Short Quiz II		Short Quiz II 3 X 50			0%
9	Understand control volume systems, mass rate equilibrium, energy, and analyze control volume systems at steady state	Students are able to understand the control volume system by analyzing the system in nozzles, diffusers, turbines, pumps, compressors and heat exchangers	**Criteria:** according to the rubric	Lectures, discussions, questions and answers, exercises and assignments 9 X 50			0%
10							0%
11							0%
12							0%
13	Understand control volume systems, mass rate equilibrium, energy, and analyze control volume systems at steady state	Students are able to understand the control volume system by analyzing the system in nozzles, diffusers, turbines, pumps, compressors and heat exchangers	**Criteria:** according to the rubric	Lectures, discussions, questions and answers, exercises and assignments 9 X 50			0%
14							0%
15							0%
16							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.