



**Universitas Negeri Surabaya
Vocational Faculty,
D4 Mechanical Engineering Study Program**

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																
Industrial Metrology	xx21401020698		T=3	P=0	ECTS=4.77	2	July 17, 2024																																
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																	
			Arya Mahendra Sakti, S.T., M.T.																																	
Learning model	Case Studies																																						
Program Learning Outcomes (PLO)	PLO study program which is charged to the course																																						
	Program Objectives (PO)																																						
	PLO-PO Matrix																																						
		P.O																																					
Short Course Description	This course is an introduction to technical measurements, namely understanding the meaning of mechanical measurements, basic methods used in general measurements and calibration. Then types of measuring instruments, use of digital techniques for mechanical measurements, measurement standards, data reading and processing, treatment of uncertainty, analytical measurements and mechanical measurements.																																						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width: 5%;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 2%;">1</td> <td style="width: 2%;">2</td> <td style="width: 2%;">3</td> <td style="width: 2%;">4</td> <td style="width: 2%;">5</td> <td style="width: 2%;">6</td> <td style="width: 2%;">7</td> <td style="width: 2%;">8</td> <td style="width: 2%;">9</td> <td style="width: 2%;">10</td> <td style="width: 2%;">11</td> <td style="width: 2%;">12</td> <td style="width: 2%;">13</td> <td style="width: 2%;">14</td> <td style="width: 2%;">15</td> <td style="width: 2%;">16</td> </tr> </table>							P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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Supporters:																																							
Supporting lecturer	Diah Wulandari, S.T., M.T. Dyah Riandadari, S.T., M.T. Firman Yasa Utama, 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	Know and understand mechanical measurements	Definition of mechanical measurements Get to know measurement systems in general Learn definitions and how to calibrate Learn standards, dimensions and units of measurement	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
2	Able to understand how to use digital techniques for mechanical measurements	Definition of mechanical measurement. Get to know measurement systems in general. Learn definitions and how to calibrate. Learn standards, dimensions and units of measurement	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
3	Able to understand how to use digital techniques for mechanical measurements	Understand the use of digital methods and how to digitize mechanical input. Understand the basic elements of digital circuits. Understand number systems. Can explain simple digital circuit schemes. Know and understand microprocessors and microcomputers. The influence of analog to digital (A/D) and digital to analog (D/A).)	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
4	Able to know and understand measurement standards	Can understand the metric system Can understand the standards of length, mass, time and frequency Understand the standards of temperature and electrical units	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
5	Able to know and understand measurement standards	Can understand the metric system Can understand the standards of length, mass, time and frequency Understand the standards of temperature and electrical units	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%

6	Able to know and understand data reading and processing	Understand the concept of electronic counting. Understand and understand the readings of measurement and data processing tools using analog and digital electricity. Study analog electrical indicators. Study and understand the cathode ray oscilloscope (OSK), Know OSK recording techniques. Know the oscillograph.	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
7	Able to know and understand data reading and processing	Understand the concept of electronic counting. Understand and understand the readings of measurement and data processing tools using analog and digital electricity. Study analog electrical indicators. Study and understand the cathode ray oscilloscope (OSK), Know OSK recording techniques. Know the oscillograph.	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
8	Material: Chapter at Meetings 2-7	USS-Sub Summative Exam/UTS Midterm Exam	Criteria: USS-Sub Summative Exam/UTS Midterm Exam	USS-Sub Summative Exam/UTS Midterm Exam 2 X 50			0%
9	Know and understand the treatment of uncertainty	Understanding error classification Understanding the treatment of systematic uncertainty and single snapshots of discussion Understanding uncertainty propagation	Criteria: According to the Rubric	Model: Problem Based Learning / Problem Based Learning Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
10	Know and understand the treatment of uncertainty	Understanding error classification Understanding the treatment of systematic uncertainty and single snapshots of discussion Understanding uncertainty propagation	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%

11	Know and understand the treatment of uncertainty	Understanding error classification Understanding the treatment of systematic uncertainty and single snapshots of discussion Understanding uncertainty propagation	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
12	Knowing and understanding strain and stress: analytical measurements	1.Know strain measurements 2.Understand the factors and installations for strain gauges 3.Understanding circuits for metal strain gauges 4.Understand strain bridge circuits	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
13	Knowing and understanding strain and stress: analytical measurements	1.Know strain measurements 2.Understand the factors and installations for strain gauges 3.Understanding circuits for metal strain gauges 4.Understand strain bridge circuits	Criteria: According to the Rubric	Model: Problem Based Learning / Learning Based on Problems Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
14	Know and understand mechanical measurements	1.Knowing the calibration of frequency sources Knowing semiconductor type strain gauges 2.Understand strain gauge switching 3.Know the stress-strain relationship 4.Know the orientation of measuring instruments and interpret the results	Criteria: According to the Rubric	Model: Problem Based Learning / Problem Based Learning Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%

15	Know and understand mechanical measurements	1.Knowing the calibration of frequency sources Knowing semiconductor type strain gauges 2.Understand strain gauge switching 3.Know the stress-strain relationship 4.Know the orientation of measuring instruments and interpret the results	Criteria: According to the Rubric	Model: Problem Based Learning / Problem Based Learning Method: Lecture, simulation, discussion, problem solving, question and answer 2 X 50			0%
16	Material: Chapter at Meetings 9-15	US-Summative Exam/UAS Final Semester Exam	Criteria: US-Summative Exam/UAS Final Semester Exam	US-Summative Exam/UAS Final Semester Exam 2 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.