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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Data Acquisition Techniques	2020103232		T=3	P=0	ECTS=4.77	6	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Lusia Rakhmawati, S.T., M.T.

Learning model	**Project Based Learning**
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 provides basic data acquisition techniques for students specializing in electronics in the electrical engineering department. In this course, we will discuss analog to digital data conversion techniques using ADC as well as the theory and practice of data sampling. After taking this course, students are expected to be able to design data acquisition systems for monitoring purposes using various sensors and ADC modules.
References	**Main :**
	1. Rachmad Setiawan. 2008. Teknik Akuisisi Data. Graha Ilmu. 2. Di Paolo Emilio, M. 2013. Data Acquisition System: From Fundamentals to Applied Design. Springer.
	Supporters:
Supporting lecturer	Prof. Dr. Bambang Suprianto, M.T. Reza Rahmadian, S.ST., M.EngSc. Arif Widodo, S.T., M.Sc.

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	Understand data acquisition systems	1. Understand the basics of data acquisition 2. Indicates data acquisition applications 3. Understand the data acquisition system block diagram		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
2	Understand Nyquist sampling theory and its application to data acquisition techniques	1. Understand Nyquist sampling theory 2. Calculate the sampling frequency 3. Create a program to determine the sampling frequency		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
3	Mention the advantages and disadvantages of the 5 types of ADC.	1. Understand how the ADC flash circuit works. 2. Understand how the dual slope ADC circuit works. 3. Understand how the SAR type ADC circuit works.		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
4	Mention the advantages and disadvantages of the 5 types of ADC.	1. Mention how the pipeline type ADC circuit works. 2. Mention how the sigma delta type ADC circuit works		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
5	Design an analog to digital data conversion circuit using ADC.	1. Design a data conversion circuit using Arduino's internal ADC 2. Designing a signal conditioning circuit		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
6	Designing a data acquisition system.	1. Design a data acquisition system with potentiometers2. Designing a data acquisition system for the LM35 temperature sensor		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
7	Designing a data acquisition system.	Designing a data acquisition system for NTC temperature sensors		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
8	UTS			3 X 50			0%

9	Create a calibration program.	1. Designing the NTC temperature sensor calibration process 2. Retrieves NTC temperature sensor data 3. Determine the NTC temperature sensor calibration formula 4. Testing NTC temperature sensor calibration		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
10	Create a calibration program.	1. Designing the NTC temperature sensor calibration process 2. Retrieves NTC temperature sensor data 3. Determine the NTC temperature sensor calibration formula 4. Testing NTC temperature sensor calibration		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
11	Create a sampling program using an interrupt timer.	1. Write a program using the interrupt timer on the Arduino module 2. Using the interrupt timer as an ADC sampling timer 3. Testing ADC sampling time		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
12	Create a sampling program using an interrupt timer.	1. Write a program using the interrupt timer on the Arduino module 2. Using the interrupt timer as an ADC sampling timer 3. Testing ADC sampling time		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%

13	Designing a digital oscilloscope data acquisition system.	1. Understand how a digital oscilloscope works 2. Designing a digital oscilloscope data acquisition system.		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
14	Designing a digital oscilloscope data acquisition system.	1. Understand how a digital oscilloscope works 2. Designing a digital oscilloscope data acquisition system.		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
15	Designing a digital oscilloscope data acquisition system.	1. Understand how a digital oscilloscope works 2. Designing a digital oscilloscope data acquisition system.		Model: Discovery learning Method: Discussion Approach: Scientific 3 X 50			0%
16							0%

Evaluation Percentage Recap: Project Based Learning

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.