



**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																																
Microcontroller Practical	2020101137		T=1	P=0	ECTS=1.59	5	July 17, 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 which is charged to the course																																						
	Program Objectives (PO)																																						
	PLO-PO Matrix																																						
		P.O																																					
PO Matrix at the end of each learning stage (Sub-PO)																																							
		<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: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 5%;">6</td> <td style="width: 5%;">7</td> <td style="width: 5%;">8</td> <td style="width: 5%;">9</td> <td style="width: 5%;">10</td> <td style="width: 5%;">11</td> <td style="width: 5%;">12</td> <td style="width: 5%;">13</td> <td style="width: 5%;">14</td> <td style="width: 5%;">15</td> <td style="width: 5%;">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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Short Course Description	The Microcontroller Practical Course is a continuation course on Microcontroller Theory. In this course learning activities are focused on the practice of designing and creating microcontroller systems. Students who will take this course are expected to have completed the Microcontroller Theory course. After taking this course, students are expected to be able to design and create microcontroller-based thematic applications.																																						
References	<b>Main :</b>																																						
	<ol style="list-style-type: none"> <li>1. Barnett, R., O 19Cull, L., Cox, S. 2007. Embedded C Programming and the Atmel AVR, 2nd Edition. Delmar.</li> <li>2. Andrianto, H., Darmawan, A. 2015. Arduino belajar cepat dan pemrograman. INFORMATIKA, Bandung.</li> <li>3. Kadir, A. 2013. Panduan Praktis Mempelajari Aplikasi Mikrokontroler Dan Pemrogramannya Menggunakan Arduino+cd, Edisi 1. Andi publisher.</li> </ol>																																						
	<b>Supporters:</b>																																						
Supporting lecturer	Prof. Dr. Bambang Suprianto, M.T. Prof. Dr. I Gusti Putu Asto Buditjahjanto, S.T., M.T. Arif Widodo, S.T., M.Sc. L. Endah Cahya Ningrum, S.Pd., M.Pd. Parama Diptya Widayaka, S.ST., 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	Students understand about Arduino and electronic components	<ol style="list-style-type: none"> <li>1.Understand about Arduino and its uses.</li> <li>2.Understand the Arduino IDE installation process.</li> <li>3.Understand electronic components and work tools.</li> </ol>	<b>Criteria:</b> Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Problem based learning 1 X 50			0%
2	Students understand about digital pins, analog pins and PWM on Arduino-Uno	<ol style="list-style-type: none"> <li>1. Understanding about digital pins on Arduino-Uno</li> <li>2. Understanding about analog pins on Arduino-Uno</li> <li>3. Understanding about PWM on Arduino-Uno</li> </ol>	<b>Criteria:</b> Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Problem based learning 1 X 50			0%
3	Students understand the basics of Arduino programming	<ol style="list-style-type: none"> <li>1.Understand about statements.</li> <li>2.Understand variables and constants.</li> <li>3.Understand the use of comments.</li> <li>4. Understanding of control structures.</li> </ol>	<b>Criteria:</b> Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Problem based learning 1 X 50			0%
4	Students understand the basics of Arduino programming	<ol style="list-style-type: none"> <li>1.Understand the break and continue statements.</li> <li>2. Understanding about arrays.</li> <li>3. Understanding about strings.</li> <li>4. Understanding about functions.</li> <li>5. Understanding about objects.</li> </ol>	<b>Criteria:</b> Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Problem based learning 1 X 50			0%
5	Students can carry out analysis on digital I/O experiments on Arduino-Uno.	<ol style="list-style-type: none"> <li>1.Can create a digital I/O experimental circuit using Arduino-Uno.</li> <li>2.Can carry out tests on digital I/O circuits using Arduino-Uno.</li> <li>3.Can perform analysis on the results of digital I/O experiments using Arduino-Uno.</li> </ol>	<b>Criteria:</b> Analysis method of digital I/O experiment report on Arduino-Uno	Project based learning 1 X 50			0%

6	Students can carry out analysis on 16x2 LCD display experiments on Arduino-Uno	<ol style="list-style-type: none"> <li>1.Can make a series of 16x2 LCD display experiments using Arduino-Uno.</li> <li>2.Can carry out tests on a 16x2 LCD display circuit using Arduino-Uno.</li> <li>3.Can carry out analysis on experimental results of a 16x2 LCD display using Arduino-Uno.</li> </ol>	<b>Criteria:</b> Analysis method from a 16x2 LCD display experimental report on Arduino-Uno	Project based learning 1 X 50			0%
7	Students can carry out analysis on keypad experiments on Arduino-Uno.	<ol style="list-style-type: none"> <li>1.Can create a series of keypad experiments using Arduino-Uno.</li> <li>2.Can carry out tests on keypad circuits using Arduino-Uno.</li> <li>3.Can carry out analysis on the results of keypad experiments using Arduino-Uno.</li> </ol>	<b>Criteria:</b> Analysis method of keypad experiment report on Arduino-Uno	Project based learning 1 X 50			0%
8	Students can carry out analysis on ADC experiments on Arduino-Uno.	<ol style="list-style-type: none"> <li>1.Can create an ADC experimental circuit using Arduino-Uno.</li> <li>2.Can carry out tests on the ADC circuit using Arduino-Uno.</li> <li>3.Can perform analysis on ADC experimental results using Arduino-Uno.</li> </ol>	<b>Criteria:</b> Analysis method of ADC experiment report on Arduino-Uno	Project based learning 1 X 50			0%
9	Students are able to design and create thematic applications based on the Arduino-Uno module.	Students are able to identify problems	<b>Criteria:</b> Method of analysis of the results of each group's problem findings	Project based learning 1 X 50			0%
10	Students are able to design and create thematic applications based on the Arduino-Uno module.	<ol style="list-style-type: none"> <li>1.Able to carry out analysis of material requirements</li> <li>2.Able to create design simulations</li> </ol>	<b>Criteria:</b> The analysis method is based on the results of material needs analysis and design simulations for each group	Project based learning 1 X 50			0%
11	Students are able to design and create thematic applications based on the Arduino-Uno module.	Able to create thematic applications based on the Arduino-Uno module	<b>Criteria:</b> The analysis method for thematic applications is based on the Arduino-Uno module which has been created in groups	Project based learning 1 X 50			0%

12	Students are able to design and create thematic applications based on the Arduino-Uno module.	Able to create thematic applications based on the Arduino-Uno module	<b>Criteria:</b> The analysis method for thematic applications is based on the Arduino-Uno module which has been created in groups	Project based learning 1 X 50		0%
13	Students are able to design and create thematic applications based on the Arduino-Uno module.	Able to carry out trials and analysis on thematic applications based on Arduino-Uno modules that have been created in groups	<b>Criteria:</b> Method of analysis of test results and analysis of thematic applications based on Arduino-Uno modules which have been created in groups	Project based learning 1 X 50		0%
14	Students are able to design and create thematic applications based on the Arduino-Uno module.	Able to make revisions to thematic applications based on Arduino-Uno modules that have been created in groups	<b>Criteria:</b> Analysis method from the results of revisions to thematic applications based on Arduino-Uno modules that have been created in groups	Project based learning 1 X 50		0%
15	Students are able to design and create thematic applications based on the Arduino-Uno module.	Students are able to compile reports and make videos on the projects they have created	<b>Criteria:</b> Method of analysis of reports and videos that have been made in groups	Project based learning 1 X 50		0%
16	UAS			1 X 50		0%

#### Evaluation Percentage Recap: Project Based Learning

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.

