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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Microcontroller	8320103077		T=3	P=0	ECTS=4.77	5	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Nur Kholis, 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 intended to provide students with theoretical and practical skills in microcontrollers. This course combines several materials that must be mastered previously, namely digital electronics, computer programming and electronic circuits. Students will understand how microcontrollers work with a practical simulation approach. After taking this microcontroller course, students are expected to be able to design and create automation systems using microcontrollers.
References	**Main :**

1. Barnett, R, O'Cull, L, Cox, S. 2007. Embedded C Programming and the Atmel AVR, 2nd Edition. Delmar.
2. Andrianto, H, Darmawan, A. 2015. Arduino belajar cepat dan pemrograman. Bandung: INFORMATIKA.
3. Kadir, A. 2013. Panduan Praktis Mempelajari Aplikasi Mikrokontroler Dan Pemrogramannya Menggunakan Arduino cd, Edisi 1. Andi publisher.

	Supporters:
Supporting lecturer	Prof. Dr. I Gusti Putu Asto Buditjahjanto, S.T., M.T. L. Endah Cahya Ningrum, 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	Students know about the Atmega AVR microcontroller.	1. Know about microcontrollers 2. Knowing about atmega 16 3. Know about ATMEGA 16 pin configuration 4. Knowing about memory on atmega 16	**Criteria:** Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
2	Students know about Atmega AVR microcontroller programming.	1. Understand identifiers, constants, data types, operators, control programs and functions 2. Understand the library functions on CV AVR.	**Criteria:** Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
3	Students know about using CodeVision AVR.	1. Able to install CV AVR 2. Learn about how to use CodeVision AVR	**Criteria:** Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Model: Problem Based Learning Method: Demonstration Approach: Scientific 3 X 50			0%
4	Students understand AVR ATmega input and output programming.	1. Understand input and output programming on blink LEDs and their simulations. 2. Understand input and output programming on the shift right led along with simulations. 3. Understand input and output programming in the ATMEGA port reading process and its simulations.	**Criteria:** Analysis method (the process of giving grades based on analysis according to the answers provided based on the level of truth)	Model: Problem Based Learning Method: Demonstration Approach: Scientific 3 X 50			0%
5	Students can carry out programming analysis on applications using a seven segment display.	1. Can determine application programs using the seven segment display on the CV AVR 2. Can create application circuit schematics using the seven segment display on Proteus 3. Can analyze application simulation results using a seven segment display	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%

6	Students can carry out programming analysis on applications using stepper motors.	1. Can determine application programs using stepper motors on CV AVR 2. Can create application circuit schematics using stepper motors on Proteus 3. Can analyze application simulation results using stepper motors	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
7	Students can carry out programming analysis on applications using a 16x2 LCD and keypad.	1. Can determine application programs using the 16x2 LCD and keypad on the CV AVR 2. Can create application circuit schematics using a 16x2 LCD and keypad on Proteus 3. Can analyze application simulation results using a 16x2 LCD and keypad	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
8	UTS			3 X 50			0%
9	Students can carry out programming analysis on the blink led application using a 16 bit timer.	1. Can determine the blink led application program using a 16 bit timer on the CV AVR 2. Can create a blink led application circuit scheme using a 16 bit timer on Proteus 3. Can analyze the simulation results of the blink led application using a 16 bit timer	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
10	Students can carry out programming analysis on digital clock applications using an 8 bit timer.	1. Can determine the digital clock application program using the 8 bit timer on the CV AVR 2. Can create a digital clock application circuit scheme using an 8 bit timer on Proteus 3. Can analyze simulation results of digital clock applications using an 8 bit timer	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%

11	Students can carry out programming analysis on counter applications.	1. Can determine the counter application program on the CV AVR 2. Can create a countery application circuit scheme in Proteus 3. Can carry out analysis of counter application simulation results	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
12	Students can carry out programming analysis on the use of serial communication.	1. Can determine the serial communication usage program on the CV AVR 2. Can carry out analysis of simulation results using serial communication	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
13	Students can carry out programming analysis on digital volt meter applications.	1. Can determine the digital volt meter application program on the CV AVR 2. Can create a digital volt meter application circuit scheme on Proteus 3. Can analyze simulation results of digital volt meter applications	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Problem Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
14	Students can carry out programming analysis on digital thermometer applications using LM35 and op-amp.	1. Can determine the digital thermometer application program using LM35 and op-amp on CV AVR 2. Can create a digital thermometer application circuit scheme using LM35 and op-amp on Proteus 3. Can analyze simulation results of digital thermometer applications using LM35 and op-amp	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Project Based Learning Method: Discussion Approach: Scientific 3 X 50			0%

15	Students can carry out programming analysis on light intensity setting applications manually and automatically.	1. Can determine the application program for manual and automatic light intensity settings on the CV AVR 2. Can create application circuit schemes for manual and automatic light intensity settings in Proteus 3. Can carry out analysis of simulation results of light intensity setting applications manually and automatically	**Criteria:** Analysis method (the process of giving grades based on the results of the analysis and presenting them in class)	Model: Project Based Learning Method: Discussion Approach: Scientific 3 X 50			0%
16	UAS			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** 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.
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.