	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
Bid Computer Application. Elka Study	8320102010	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	4	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-3	Develop logical, critical, systematic and creative thinking in carrying out specific work in their field of expertise and in accordance with work competency standards in the field concerned
	PLO-4	Develop yourself continuously and collaborate.
	PLO-13	Able to design circuits, devices and products in the electrical and electronics engineering expertise program (SSC3.1).
	Program Objectives (PO)	
	PO - 1	Develop logical, critical, systematic and creative thinking in programming embedded systems in accordance with work competency standards in the field of electronics.
	PO - 2	Develop yourself continuously and collaborate through the project completion process
	PO - 3	Able to design circuits, devices and embedded system products (microcontrollers and IoT).
	PLO-PO Matrix	

P.O	PLO-3	PLO-4	PLO-13
PO-1	✔		
PO-2		✔	
PO-3			✔

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
PO-1	✔	✔	✔	✔	✔											
PO-2						✔								✔	✔	✔
PO-3							✔	✔	✔	✔		✔	✔			

Short Course Description	This course teaches basic programming concepts, practical and technical knowledge and experience regarding algorithms, flowcharts and their application in embedded system programming languages. The basic materials for making programs are the basics of programming, introduction to programming languages for embedded systems, embedded system programming structures, solving conditions, functions, abstract data types/structures.
References	**Main :**

1. D.S. Malik. 2011. C++ Programming: From Problem Analysis to Program Design. Fifth Edition, USA : Course Technology, Cengage Learning.
2. Deitel, Paul and Harvey Deitel. 2013. C++ How To Program, Eight Edition. Pearson Educaton, Inc.
3. Kadir, A. 2013. Pengenalan Algoritma Pendekatan Secara Visual dan Interaktif Menggunakan RAPTOR. Penerbit Andi.
4. Raharjo, Budi. 2014. Pemrograman C++ Edisi Revisi: Mudah&Cepat Menjadi Master C++. Penerbit Informatika.
5. Sianipar, RH. 2013. C++ Untuk Programmer. Penerbit Informatika.
6. Stroustrup, Bjarne. 2013. The C++ programming language, Fourth edition. Pearson Education, Inc

Supporters:	
Supporting lecturer	Prof. Dr. Bambang Suprianto, M.T. Dr. Lilik Anifah, S.T., M.T. Miftahur Rohman, S.T., M.T. 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	Develop logical, critical, systematic and creative thinking in programming embedded systems in accordance with work competency standards	Students are able to: - Explain the basic concepts of algorithms - Identify flowchart notations - Apply algorithms and flowcharts to solve problems	**Form of Assessment** : Participatory Activities	Scientific approach, lectures, questions and answers, discussions, problem-based learning, and 3 X 50 practicum			5%
2	Students are able to understand the writing structure of the C programming language	- Identifying types of data types - Explaining the rules for defining identifiers - Identifying the differences between variables and constants - Identifying types of operators - Explaining the priority of arithmetic operators - Identifying types of input and output functions - Implementing input and output functions in programs	**Form of Assessment** : Participatory Activities	Scientific approach, lectures, questions and answers, discussions, direct learning, and 3 X 50 practicum			5%
3	Microcontroller programming using Ultrasonic sensors and LM35	Students are able to: - Identify types of input and output functions - Apply input and output functions in programs	**Form of Assessment** : Project Results Assessment / Product Assessment	Scientific approach, lectures, questions and answers, discussions, problem-based learning, and 3 X 50 practicum			5%

4	Students are able to create programs with the branching concept	Students are able to: - Identify differences in conditions and actions - Explain single, multiple and multilevel branching - Explain branching using case selection - Apply the concept of branching to programs	**Criteria:** Results of the Microcontroller Programming Project using the Raindrop sensor **Form of Assessment** : Project Results Assessment / Product Assessment	Scientific approach, lectures, questions and answers, discussions, problem-based learning, and 6 X 50 practicum		**Material:** Microcontroller programming using the Raindrop sensor **Reader:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%
5	Students are able to program microcontrollers using PIR sensors	Students are able to program microcontrollers using PIR sensors	**Criteria:** Project results and observations of the completion of the Microcontroller Programming project using a PIR sensor **Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning		**Material:** Microcontroller programming using PIR sensors **Reader:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%
6	Students are able to create Microcontroller Programming programs using the DHT 11 sensor	students are able to create Microcontroller Programming programs using the DHT 11 sensor	**Criteria:** Results of observations and projects in completing creating a Microcontroller Programming program using the DHT 11 sensor **Form of Assessment** : Project Results Assessment / Product Assessment	Scientific approach, lectures, questions and answers, discussions, project based learning, and 6 X 50 practicum		**Material:** create a microcontroller programming program using the DHT 11 sensor. **Library:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%
7	Microcontroller programming using LDR sensors	Mahasisha did Microcontroller Programming using an LDR sensor	**Criteria:** Observation results and results of the Microcontroller Programming project using the LDR sensor **Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning		**Material:** Microcontroller programming using LDR sensors **Reader:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%
8	Students are able to program microcontrollers using the Flame Detector sensor	Students complete Microcontroller Programming using the Flame Detector sensor well	**Criteria:** Observation results and results of the Microcontroller Programming project using the Flame Detector sensor **Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning 3 X 50		**Material:** Microcontroller programming using a Flame Detector sensor. **Library:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%

9	IoT-based monitoring programming using Node MCU and Ultasonic sensors	Students are able to carry out IoT-based monitoring programming using Node MCU and Ultrasonic sensors	**Criteria:** Observation results and results of IoT-based Monitoring Programming projects using Node MCU and Ultasonic sensors **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Cooperative Method: Lecture, project based learning, discussion, presentation and practicum 6 X 50		**Material:** IoT-based monitoring programming using Node MCU and Ultasonic sensors. **References:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%
10	IoT-based monitoring programming using Node MCU and LM35 sensors	Observation results and results of the IoT-based Monitoring Programming project using Node MCU and LM35 sensors	**Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning			5%
11	Able to create programs with string concepts	Students are able to: - Explain the definition of a string - Explain how to declare a string variable - Explain how to enter and display the contents of a string variable - Explain how to access string elements - Apply strings in the program		Approach: Scientific Model: Cooperative Method: Lecture, problem-based learning, discussion, presentation and practicum 3 X 50		**Material:** IoT-based Monitoring Programming using Node MCU and LM35 sensor **Library:**	0%
12	Students are able to use functions in making programs	Students are able to carry out IoT-based monitoring programming using Node MCU, PIR and DHT 11 well	**Criteria:** Observation results and results of the IoT-based Monitoring Programming project using Node MCU, PIR and DHT 11 **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Cooperative Method: Lecture, project based learning, discussion, presentation and practicum 3 X 50		**Material:** Observation results and results of IoT-based Monitoring Programming projects using Node MCU, PIR and DHT 11 **References:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%
13	IoT-based monitoring programming using Node MCU, LDR and Flame Detector	Students are able to carry out IoT-based monitoring programming using Node MCU, LDR and Flame Detector	**Criteria:** Observation results and results of IoT-based Monitoring Programming projects using Node MCU, LDR and Flame Detector **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Cooperative Method: Lecture, project based learning, discussion, presentation and practicum 3 X 50		**Material:** IoT-based Monitoring Programming using Node MCU, LDR and Flame Detector **Reader:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	5%

14	Students are able to create programs with the concept of structure	Students are able to program IoT-based monitoring and control using Node MCU and a combination of various sensors	**Criteria:** Observation results and results of IoT-based monitoring and control programming projects using Node MCU and a combination of various sensors **Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning 6 X 50		**Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors. **Reader:** *Sianipar, RH. 2013. C for Programmers. Informatics Publisher.* **Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors **Reference:** *Kadir, A. 2013. Introduction to Visual and Interactive Approach Algorithms Using RAPTOR. Andi Publisher.* **Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors. **Readers:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	10%

15	Students are able to create programs with the concept of structure	Students are able to program IoT-based monitoring and control using Node MCU and a combination of various sensors	**Criteria:** Observation results and results of IoT-based monitoring and control programming projects using Node MCU and a combination of various sensors **Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning 6 X 50		**Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors. **Reader:** *Sianipar, RH. 2013. C for Programmers. Informatics Publisher.* **Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors **Reference:** *Kadir, A. 2013. Introduction to Visual and Interactive Approach Algorithms Using RAPTOR. Andi Publisher.* **Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors. **Readers:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	10%

16	Students are able to create programs with the concept of structure	Students are able to program IoT-based monitoring and control using Node MCU and a combination of various sensors	**Criteria:** Observation results and results of IoT-based monitoring and control programming projects using Node MCU and a combination of various sensors **Form of Assessment** : Project Results Assessment / Product Assessment	Project based learning 6 X 50		**Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors. **Reader:** *Sianipar, RH. 2013. C for Programmers. Informatics Publisher.* **Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors **Reference:** *Kadir, A. 2013. Introduction to Visual and Interactive Approach Algorithms Using RAPTOR. Andi Publisher.* **Material:** IoT-based monitoring and control programming using Node MCU and a combination of various sensors. **Readers:** *Stroustrup, Bjarne. 2013. The C programming language, Fourth edition. Pearson Education, Inc*	20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	10%
2.	Project Results Assessment / Product Assessment	90%
		100%

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.