



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																																																		
Telemetry and Control	2020102360		T=0	P=0	ECTS=0	5	July 17, 2024																																																		
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																			
	Dr. Farid Baskoro., S.T.,M.T ; S.T., M.T; Miftahur rohman.,S.T.,M.T		Prof. Dr. I Gusti Putu Asto Buditjahjanto, S.T., M.T			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)																																																								
	PO - 1	Students are able to design and analyze remote measurement systems; 2. Students are able to design and analyze remote control systems; 3. Students are able to apply IoT concepts in remote measurement and control; 4. Students are able to create GUIs for remote monitoring and control																																																							
	PLO-PO Matrix																																																								
		<table border="1" style="margin: auto;"> <tr><td style="width: 50px; height: 20px;">P.O</td></tr> <tr><td style="width: 50px; height: 20px;">PO-1</td></tr> </table>						P.O	PO-1																																																
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PO-1																																																									
PO Matrix at the end of each learning stage (Sub-PO)																																																									
	<table border="1" style="margin: auto;"> <tr> <td style="width: 50px; height: 20px;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td></td> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> <tr> <td style="width: 50px; height: 20px;">PO-1</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>						P.O	Week																	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																									
PO-1																																																									
Short Course Description	In this course, basic concepts of remote measurement and control systems are discussed, components of telemetry and remote control systems, quantization and mu-demux theory, telemetry system design, remote control system design. IoT.																																																								
References	Main :																																																								
	<ol style="list-style-type: none"> 1. Swobada G.1997.telecontrol method and Application of telemetering and remote control-van nostrand. 2. Schwartz M.1970.information transmission-modulation and noise- MGH. 																																																								
	Supporters:																																																								
Supporting lecturer	Endryansyah, S.T., M.T. Dr. Farid Baskoro, S.T., 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	Basic concepts of remote measurement and control systems	1.Explain the basic concepts of remote sensing 2.Explain the basic concepts of remote control	Form of Assessment : Participatory Activities	1. Explain the basic concept of remote sensing 2. Explain the basic concept of remote control 3		Material: 1. Explain the basic concepts of remote sensing 2. Explain the basic concepts of remote control Reference: Swobada G.1997.telecontrol method and Application of telemetering and remote control-van nostrand.	4%
2	Basic concepts of remote measurement and control systems	1.Explain the basic concepts of remote sensing 2.Explain the basic concepts of remote control	Form of Assessment : Participatory Activities	1. Explain the basic concept of remote sensing 2. Explain the basic concept of remote control 3		Material: 1. Explain the basic concepts of remote sensing 2. Explain the basic concepts of remote control Reference: Swobada G.1997.telecontrol method and Application of telemetering and remote control-van nostrand.	4%
3	Components of a remote measurement and control system	1. Describe and explain the block diagram of the telemetry and control system 2. Describe the sensors used for remote measurements 3. Describe the actuators used for remote control	Form of Assessment : Test	Journal Review of 3 X 50 telemetry and control		Material: . Explain the background to the importance of using remote sensing concepts 2. Explain the background to the importance of using remote control concepts 3. Formulate telemetry and control problems 4. Explain the literature review used for telemetry and control 5. Explain the design of telemetry and control systems 6. Explain how to collect data and analyze data Library: Swobada G.1997.telecontrol method and Application of telemetering and remote control-van nostrand.	4%
4	Design and analysis of a remote sensing system for measuring light intensity using a 433Mhz telemetry module	1. Design and implement a remote sensing system for measuring light intensity 2. Create an Arduino program for measuring light intensity 3. Create a GUI 4. Data collection and data analysis	Form of Assessment : Project Results Assessment / Product Assessment	Giving assignments, presentations and discussions, 3 X 50 tool design		Material: 1. Design and implement a remote sensing system for measuring light intensity 2. Create an Arduino program for measuring light intensity 3. Create a GUI 4. Data collection and data analysis Reference: Swobada G.1997.telecontrol method and Application of telemetering and remote control - van nostrand.	4%

5	Design and analysis of a remote sensing system for measuring light intensity using a 433Mhz telemetry module	1. Design and implement a remote sensing system for measuring light intensity 2. Create an Arduino program for measuring light intensity 3. Create a GUI 4. Data collection and data analysis	Form of Assessment : Project Results Assessment / Product Assessment	Giving assignments, presentations and discussions, 3 X 50 tool design		Material: 1. Design and implement a remote sensing system for measuring light intensity 2. Create an Arduino program for measuring light intensity 3. Create a GUI 4. Data collection and data analysis Reference: <i>Swobada G.1997.telecontrol method and Application of telemetering and remote control - van nostrand.</i>	4%
6	Design and analysis of a remote sensing system for measuring electric current using a 433Mhz telemetry module	1. Design and implement a remote sensing system for measuring electric current 2. Create an Arduino program for measuring electric current 3. Create a GUI 4. Data collection and data analysis	Criteria: 1. Design and implement a remote sensing system for measuring electric current 2. Create an Arduino program for measuring electric current 3. Create a GUI 4. Data collection and data analysis Form of Assessment : Participatory Activities	Giving assignments, presentations and discussions, 3 X 50 tool design			4%
7	Design and analysis of remote sensing systems for temperature and humidity measurements using a 433Mhz telemetry module	1. Design and implement a remote sensing system for temperature and humidity measurements 2. Create an Arduino program for temperature and humidity measurements 3. Create a GUI 4. Data collection and data analysis	Form of Assessment : Project Results Assessment / Product Assessment	: 1. Design and implement a remote sensing system for temperature and humidity measurements 2. Create an Arduino program for temperature and humidity measurements 3. Create a GUI 4. Data collection and data analysis 3 X 50			4%
8	U.S.S	1. Students can complete the questions within the specified time. 2. Students get a score in the more than adequate category	Form of Assessment : Test	Written Test/Individual Assignment 3 X 50			20%
9	Design and analysis of a remote control system for DC motor regulation using a 433 MHz telemetry module	1. Design and implement a remote control system for DC motor settings 2. Create an Arduino program for DC motor settings 3. Create a GUI 4. Data collection and data analysis	Form of Assessment : Participatory Activities	1. Design and implement a remote control system for DC motor settings 2. Create an Arduino program for DC motor settings 3. Create a GUI 4. Data collection and data analysis 3 X 50		Materials: 1. Design and implement a remote control system for DC motor control 2. Create an Arduino program for DC motor control 3. Create a GUI 4. Data retrieval and data analysis Library: <i>Swobada G.1997.telecontrol method and Application of telemetering and remote control - van nostrand.</i>	4%

10	Design and analysis of remote control systems for solenoid settings using a 433 MHz telemetry module	1. Design and implement a remote control system for setting solenoid settings 2. Create an Arduino program for setting solenoid settings 3. Create a GUI 4. Data collection and data analysis	Criteria: according to the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment	1. Design and implement a remote control system for setting solenoid settings 2. Create an Arduino program for setting solenoid settings 3. Create a GUI 4. Data collection and data analysis 3 X 50			4%
11	Design and analysis of a remote control system for setting servo motors using a 433 MHz telemetry module	1. Design and implement a remote control system for setting servo motor settings 2. Create an Arduino program for setting servo motors 3. Create a GUI 4. Data collection and data analysis	Criteria: according to the assessment rubric	1. Design and implement a remote control system for setting servo motor settings 2. Create an Arduino program for setting servo motors 3. Create a GUI 4. Data collection and data analysis 3 X 50			4%
12	Design and analysis of remote sensing systems with IoT concepts	1. Design and implement a remote sensing system with the IoT concept 2. Create an Arduino program for a remote sensing system with the IoT concept 3. Create a GUI 4. Data retrieval and data analysis	Criteria: according to the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment	Giving assignments, presentations and discussions, 3 X 50 tool design			4%
13	Design and analysis of remote sensing systems with IoT concepts	1. Design and implement a remote sensing system with the IoT concept 2. Create an Arduino program for a remote sensing system with the IoT concept 3. Create a GUI 4. Data retrieval and data analysis	Form of Assessment : Project Results Assessment / Product Assessment	Giving assignments, presentations and discussions, 3 X 50 tool design			4%
14	Design and analysis of remote control systems using the IoT concept	1. Design and remote control system with the IoT concept 2. Create an Arduino program for a remote control system with the IoT concept 3. Create a GUI 4. Data retrieval and data analysis	Criteria: according to the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment	Giving assignments, presentations and discussions, 3 X 50 tool design			4%

15	Design and analysis of remote control systems using the IoT concept	1. Design and remote control system with the IoT concept 2. Create an Arduino program for a remote control system with the IoT concept 3. Create a GUI 4. Data retrieval and data analysis	Criteria: according to the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment	Giving assignments, presentations and discussions, 3 X 50 tool design			4%
16	US	1. Students can complete the questions within the specified time. 2. Students get a score in the more than adequate category	Form of Assessment : Test	3 X 50			24%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	16%
2.	Project Results Assessment / Product Assessment	32%
3.	Test	48%
		96%

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.