



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																																																																																													
Introduction to Electrical Engineering	2020102107	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	1	July 17, 2024																																																																																													
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																														
	Prof. Dr. Bambang Suprianto, M.T.; Dr. Lusia Rakhmawati, S.T., M.T.		Prof. Dr. Bambang Suprianto, M.T.			Dr. Lusia Rakhmawati, S.T., M.T.																																																																																														
Learning model	Case Studies																																																																																																			
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																			
	Program Objectives (PO)																																																																																																			
	PO - 1	Able to plan, complete and evaluate tasks related to the fields of electrical engineering, electronics, telecommunications systems and intelligent computing, as well as regulatory systems																																																																																																		
	PO - 2	Able to understand the need for lifelong learning in the field of Introduction to Electrical Engineering which is related to relevant current issues																																																																																																		
	PO - 3	Able to design simple systems or process components to be applied in the field of electrical engineering																																																																																																		
	PLO-PO Matrix																																																																																																			
		<table border="1" style="margin-left: 20px;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> </table>						P.O	PO-1	PO-2	PO-3																																																																																									
	P.O																																																																																																			
	PO-1																																																																																																			
	PO-2																																																																																																			
PO-3																																																																																																				
PO Matrix at the end of each learning stage (Sub-PO)																																																																																																				
	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>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> <tr><td>PO-2</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> <tr><td>PO-3</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> </tbody> </table>																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																
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	Students have the provisions to enter studies in the field of Electrical Engineering. In this course, students are introduced to basic concepts in electrical engineering, from electrical circuits to control systems. The main aim of this course is to ensure that students have a strong understanding of the basic principles in this field and are able to apply them in a variety of contexts. Apart from that, students are also invited to understand the role of electrical technology in everyday life and industry, as well as the importance of professional ethics and safety in electrical engineering practice. Through the case study learning method, students are given the opportunity to deepen their understanding of this field and prepare themselves to explore further topics in the field of Electrical Engineering.																																																																																																			
References	Main :																																																																																																			
	<ol style="list-style-type: none"> 1. Charles Alexander, Matthew Sadiku, Fundamentals of Electric Circuits, McGraw Hill; 6th edition, 2016 2. John G. Proakis, Masoud Salehi, Communication Systems Engineering, Pearson; 2nd edition, 2001 3. Jr. Charles E. Harris, Michael S. Pritchard etc, Engineering Ethics: Concepts and Cases, Cengage Learning; 6th edition, 2018 4. Farid Golnaraghi , Benjamin Kuo, , Automatic Control Systems, McGraw Hill; 10th edition , 2017 5. Leonard S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press; 2nd edition , 1996 6. Martin C, Electrical Engineering Career: Becoming an Electrical Engineer, Kindle Edition, 2023 7. Jim Ledin, Dave Farley, Modern Computer Architecture and Organization: Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers, Packt Publishing; 2nd ed. edition, 2022 8. Samuel O. Agbo , Principles of Modern Communication Systems, Cambridge University Press; 1st edition , 2017 																																																																																																			
	Supporters:																																																																																																			
	<ol style="list-style-type: none"> 1. Thomas Floyd, Digital Fundamentals, Pearson; 11th edition, 2014 2. Stephen Chapman, Electric Machinery Fundamentals, McGraw-Hill Science/Engineering/Math; 4th edition, 2003 																																																																																																			
Supporting lecturer	Dr. Tri Rijanto, M.Pd., M.T. Prof.Dr. Tri Wrahatnolo, M.Pd., M.T. Dr. Lilik Anifah, S.T., M.T. Dr. Lusia Rakhmawati, S.T., M.T. Pradini Puspitaningayu, S.T., M.T., Ph.D.																																																																																																			

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	<p>1.Explain the definition of electrical engineering and its scope</p> <p>2.Explain the role of electrical engineering in various industries and everyday life</p> <p>3.Discuss career prospects in the field of electrical engineering</p>	<p>1.Accuracy in explaining the definition of electrical engineering and its scope</p> <p>2.accuracy in explaining the role of electrical engineering in various industries and everyday life</p> <p>3.Accurate collaboration and communication discussing career prospects in the field of electrical engineering</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Introduction to Electrical Engineering Bibliography: Leonard S. Bobrow, <i>Fundamentals of Electrical Engineering</i>, Oxford University Press; 2nd edition, 1996</p>	2%
2	<p>1.Explains the basic concepts of electric current, electric voltage, and basic laws of electricity</p> <p>2.Identify the basic components of electronics: resistors, capacitors, and inductors.</p> <p>3.Demonstrate simple electrical circuits and basic measurements</p>	<p>1.Accurately explains the basic concepts of electric current, electric voltage, and basic laws of electricity</p> <p>2.Accuracy of identifying basic electronic components: resistors, capacitors, and inductors.</p> <p>3.Accurate demonstration of simple electrical circuits and basic measurements</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Basics of Electricity and Electronics Bibliography: Leonard S. Bobrow, <i>Fundamentals of Electrical Engineering</i>, Oxford University Press; 2nd edition, 1996</p>	2%
3	<p>1.Explain the basic principles of generation, distribution and use of electrical energy.</p> <p>2.Explain the working principles and applications of transformers, generators and electric motors</p> <p>3.Discuss alternative energy sources and energy sustainability</p>	<p>1.Accuracy explains the basic principles of generation, distribution and use of electrical energy.</p> <p>2.Accurately explains the working principles and applications of transformers, generators and electric motors</p> <p>3.The accuracy of discussing alternative energy sources and energy sustainability</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Electric Power Systems References: Charles Alexander, Matthew Sadiku, <i>Fundamentals of Electric Circuits</i>, McGraw Hill; 6th edition, 2016</p> <hr/> <p>Material: Electrical Power Systems Bibliography: Stephen Chapman, <i>Electric Machinery Fundamentals</i>, McGraw-Hill Science/Engineering/Math; 4th edition, 2003</p>	2%
4	<p>1.Explain the basic architecture of a computer: CPU, RAM, and storage devices</p> <p>2.Explain computer hardware: motherboard, CPU, GPU, and input/output devices</p> <p>3.Identify operating systems and application software.</p>	<p>1.Accuracy explains the basic architecture of a computer: CPU, RAM, and storage devices</p> <p>2.Accurately describes computer hardware: motherboard, CPU, GPU, and input/output devices</p> <p>3.Accuracy of identifying operating systems and application software.</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Computer Systems Bibliography: Jim Ledin, Dave Farley, <i>Modern Computer Architecture and Organization: Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers</i>, Packt Publishing; 2nd ed. edition, 2022</p>	2%
5	<p>1.Explain automatic control and regulation systems</p> <p>2.Explain the application of control systems in industrial automation and mechatronics</p> <p>3.Analyze case studies about process control using control systems</p>	<p>1.Precision describes an automatic control and regulation system</p> <p>2.Accuracy of control system applications in industrial automation and mechatronics</p> <p>3.The accuracy of analyzing case studies about process control using control systems</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Control Systems Bibliography: Farid Golnaraghi , Benjamin Kuo. , <i>Automatic Control Systems</i>, McGraw Hill; 10th edition, 2017</p>	2%

6	<p>1.Explains the basics of telecommunications, including the definition, main components, and objectives of communication.</p> <p>2.Explain the structure and architecture of telecommunications networks, including network topology, communication protocols, and functions involved in data transmission.</p> <p>3.Analyze case studies on the development of 5G technology, the Internet of Things (IoT), and high-speed wireless networks</p>	<p>1.Accurately explains the basics of telecommunications, including the definition, main components, and purpose of communication.</p> <p>2.Accuracy describes the structure and architecture of telecommunications networks, including network topology, communications protocols, and functions involved in data transmission.</p> <p>3.Accuracy of analyzing case studies about the development of 5G technology, Internet of Things (IoT), and high-speed wireless networks</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Telecommunications Engineering Bibliography: <i>John G. Proakis, Masoud Salehi, Communication Systems Engineering, Pearson; 2nd edition, 2001</i></p> <p>Material: Modern telecommunications systems Bibliography: <i>Samuel O. Agbo, Principles of Modern Communication Systems, Cambridge University Press; 1st edition, 2017</i></p>	2%
7	<p>1.Explain ethical responsibilities in electrical engineering practice</p> <p>2.Explain occupational safety and health in the electrical engineering industry</p> <p>3.Discuss cyber security and data privacy</p>	<p>1.Accuracy defines ethical responsibilities in electrical engineering practice</p> <p>2.Accuracy in explaining occupational safety and health in the electrical engineering industry</p> <p>3.Accuracy of discussing cyber security and data privacy</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Professional Ethics and Safety Reader: <i>Jr. Charles E. Harris, Michael S. Pritchard etc, Engineering Ethics: Concepts and Cases, Cengage Learning; 6th edition, 2018</i></p>	3%
8	Explain ethical responsibilities in electrical engineering practice	Accuracy in taking Midterm Exams	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Written Test 2 X 50		<p>Material: Professional Ethics and Safety Reader: <i>Jr. Charles E. Harris, Michael S. Pritchard etc, Engineering Ethics: Concepts and Cases, Cengage Learning; 6th edition, 2018</i></p> <p>Material: Meeting material 1-7 Bibliography: <i>Charles Alexander, Matthew Sadiku, Fundamentals of Electric Circuits, McGraw Hill; 6th edition, 2016</i></p>	20%
9	<p>1.Explain commonly used electronic tools and devices.</p> <p>2.Demonstrate the use of electronic devices in various applications</p>	<p>1.Accurately describes commonly used electronic tools and devices</p> <p>2.Accuracy demonstrates the use of electronic devices in a variety of applications</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Introduction to Electronic Tools and Devices Bibliography: <i>Stephen Chapman, Electric Machinery Fundamentals, McGraw-Hill Science/Engineering/Math; 4th edition, 2003</i></p> <p>Material: Introduction to Electronic Tools and Devices References: <i>Leonard S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press; 2nd edition, 1996</i></p>	5%
10	<p>1.Explain safety and laboratory practical procedures</p> <p>2.Practical demonstration of basic experiments in electrical engineering</p>	<p>1.Accurately explains safety and laboratory practical procedures</p> <p>2.Accuracy of practical demonstration of basic experiments in electrical engineering</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50		<p>Material: Introduction to Laboratory Practicum References: <i>Leonard S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press; 2nd edition, 1996</i></p>	5%

11	<p>1. Discuss the latest trends in electrical engineering</p> <p>2. Explains the latest technology applications such as artificial intelligence, Internet of Things (IoT), and autonomous vehicles</p>	<p>1. Accuracy of discussing the latest trends in electrical engineering</p> <p>2. Accuracy explains the latest technology applications such as artificial intelligence, Internet of Things (IoT), and autonomous vehicles</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50</p>		<p>Material: Latest Technology Trends and Applications References: Samuel O. Agbo, <i>Principles of Modern Communication Systems</i>, Cambridge University Press; 1st edition, 2017</p>	5%
12	<p>1. Analyze case studies about the latest technology applications in industry and everyday life</p> <p>2. Present a case study report</p>	<p>1. Accuracy of analyzing case studies about the latest technology applications in industry and everyday life</p> <p>2. Accuracy of presenting case study reports</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50</p>		<p>Material: Latest Technology Trends and Applications References: Samuel O. Agbo, <i>Principles of Modern Communication Systems</i>, Cambridge University Press; 1st edition, 2017</p> <hr/> <p>Material: technology trends in careers in electrical engineering Reference: Martin C, <i>Electrical Engineering Career: Becoming an Electrical Engineer</i>, Kindle Edition, 2023</p>	5%
13	<p>1. Analyze case studies about the latest technology applications in industry and everyday life</p> <p>2. Present a case study report</p>	<p>1. Accuracy of analyzing case studies about the latest technology applications in industry and everyday life</p> <p>2. Accuracy of presenting case study reports</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50</p>		<p>Material: Latest Technology Trends and Applications References: Samuel O. Agbo, <i>Principles of Modern Communication Systems</i>, Cambridge University Press; 1st edition, 2017</p> <hr/> <p>Material: technology trends in careers in electrical engineering Reference: Martin C, <i>Electrical Engineering Career: Becoming an Electrical Engineer</i>, Kindle Edition, 2023</p>	5%
14	<p>1. Analyze case studies about the latest technology applications in industry and everyday life</p> <p>2. Present a case study report</p>	<p>1. Accuracy of analyzing case studies about the latest technology applications in industry and everyday life</p> <p>2. Accuracy of presenting case study reports</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50</p>		<p>Material: Latest Technology Trends and Applications References: Samuel O. Agbo, <i>Principles of Modern Communication Systems</i>, Cambridge University Press; 1st edition, 2017</p> <hr/> <p>Material: technology trends in careers in electrical engineering Reference: Martin C, <i>Electrical Engineering Career: Becoming an Electrical Engineer</i>, Kindle Edition, 2023</p>	5%
15	<p>1. Analyze case studies about the latest technology applications in industry and everyday life</p> <p>2. Present a case study report</p>	<p>1. Accuracy of analyzing case studies about the latest technology applications in industry and everyday life</p> <p>2. Accuracy of presenting case study reports</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Direct learning, Presentation, Discussion, Assignment, Reflection 2 X 50</p>		<p>Material: Latest Technology Trends and Applications References: Samuel O. Agbo, <i>Principles of Modern Communication Systems</i>, Cambridge University Press; 1st edition, 2017</p> <hr/> <p>Material: technology trends in careers in electrical engineering Reference: Martin C, <i>Electrical Engineering Career: Becoming an Electrical Engineer</i>, Kindle Edition, 2023</p>	5%

16	1. Carrying out Final Semester Examinations 2. Present a case study report	Accuracy in taking Final Semester Exams	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Tests	Written test 2 X 50		Material: Meeting material 1-7 Bibliography: Charles Alexander, Matthew Sadiku, <i>Fundamentals of Electric Circuits</i> , McGraw Hill; 6th edition, 2016 Material: Meeting materials 9-15 References: Leonard S. Bobrow, <i>Fundamentals of Electrical Engineering</i> , Oxford University Press; 2nd edition, 1996	30%
----	---	---	---	------------------------	--	---	-----

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	53%
2.	Project Results Assessment / Product Assessment	22%
3.	Test	25%
		100%

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.