



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																																																																		
Engineering Physics	8320102220	Compulsory Study Program Subjects	T=2 P=0 ECTS=3.18	1	August 7, 2023																																																																		
AUTHORIZATION		SP Developer	Course Cluster Coordinator	Study Program Coordinator																																																																			
		Roswina Dianawati, S.Pd., M.Ed.	Dr. Puput Wanarti R., S.T., M.T.	Dr. Nur Kholis, S.T., M.T.																																																																			
Learning model	Case Studies																																																																						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																						
	PLO-5	Able to align the electrical and electronics engineering training curriculum in vocational education that is relevant to the demands of global industrial development (Education).																																																																					
	PLO-8	Have extensive knowledge in the fields of general knowledge, social and humanities (General).																																																																					
	Program Objectives (PO)																																																																						
	PO - 1	Have the ability to communicate effectively, think critically, and make appropriate decisions																																																																					
	PO - 2	Master basic physics concepts and apply them to the field of electrical engineering																																																																					
	PLO-PO Matrix																																																																						
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>P.O</td> <td>PLO-5</td> <td>PLO-8</td> </tr> <tr> <td>PO-1</td> <td></td> <td></td> </tr> <tr> <td>PO-2</td> <td></td> <td></td> </tr> </table>				P.O	PLO-5	PLO-8	PO-1			PO-2																																																											
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	PO-1																																																																						
PO-2																																																																							
PO Matrix at the end of each learning stage (Sub-PO)																																																																							
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2">P.O</td> <td colspan="16">Week</td> </tr> <tr> <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>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> </table>				P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																	PO-2																
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PO-1																																																																							
PO-2																																																																							
Short Course Description	Study of basic physics concepts and their application in electrical engineering, including quantities and vectors, Coulomb's law, electric magnetism, electromagnetic induction, and capacitance.																																																																						
References	Main :																																																																						
	1. Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son. 2. Sears Zemansky. 1986. Fisika Untuk Universitas I. Binacipta. 3. Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, edisi kesepuluh. Erlangga.																																																																						
	Supporters:																																																																						
	1. Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, edisi kesepuluh. Erlangga.																																																																						
Supporting lecturer	Dr. Hj. Euis Ismayati, M.Pd. Dr. Puput Wanarti Rusimanto, S.T., M.T. Dr. Subuh Isnur Haryudo, S.T., M.T. Roswina Dianawati, S.Pd., M.Ed.																																																																						
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 are able to interpret vector concepts and calculations in the context of engineering physics	1.Students are able to explain the basic concepts of vectors and scalars 2.Students are able to apply vector operations in real cases	Criteria: 1.Ability to explain the definition of vectors and their differences with scalars 2.Ability to solve problems related to vector operations Form of Assessment : Participatory Activities	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	Material: Definition and types of vectors; Vector operations; Application of vectors in physics; Representation of vectors in cartesian, polar and other coordinates References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%
2	Students are able to describe their understanding of the properties of electric charges and their interactions in various environments	1.Students are able to define electric charge and its types 2.Students are able to analyze interactions between contents in case studies	Criteria: 1.Ability to explain the concept of charge and its properties 2.Ability to apply Coulomb's law in real contexts Form of Assessment : Participatory Activities	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	Material: Basic concepts of electric charge; Laws of conservation of charge; Interaction between charges; Causes and effects of electric charges References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%
3	Students are able to describe their understanding of the properties of electric charges and their interactions in various environments	1.Students are able to define electric charge and its types 2.Students are able to analyze interactions between contents in case studies	Criteria: 1.Ability to explain the concept of charge and its properties 2.Ability to apply Coulomb's law in real contexts	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	Material: Basic concepts of electric charge; Laws of conservation of charge; Interaction between charges; Causes and effects of electric charges References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%
4	Students are able to dissect the main aspects of electric fields and communicate their application in real situations	1.Students are able to identify sources of electric fields 2.Students are able to analyze the distribution of electric fields in case studies	Criteria: 1.Ability to define and describe sources of electric fields 2.Ability to calculate the electric field at a certain point based on case information Form of Assessment : Participatory Activities	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	Material: Definition and basic properties of electric fields, electric fields due to point charges, principle of superposition in electric fields, electric field lines and equipotential surfaces. References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%

5	Students are able to dissect the main aspects of electric fields and communicate their application in real situations	<ol style="list-style-type: none"> 1. Students are able to identify sources of electric fields 2. Students are able to analyze the distribution of electric fields in case studies 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Ability to define and describe sources of electric fields 2. Ability to calculate the electric field at a certain point based on case information <p>Form of Assessment : Participatory Activities</p>	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	<p>Material: Definition and basic properties of electric fields, electric fields due to point charges, principle of superposition in electric fields, electric field lines and equipotential surfaces.</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
6	Students are able to describe the phenomena and applications of magnetic fields in an engineering context	<ol style="list-style-type: none"> 1. Students are able to explain the nature and sources of magnetic fields 2. Students are able to describe magnetic fields from electric currents in case studies 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Ability to describe magnetic fields and their effects on matter 2. Ability to apply the Biot-Savart law based on case information <p>Form of Assessment : Participatory Activities</p>	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	<p>Material: Basic concepts of magnetic fields and their sources, Magnetic fields due to electric currents, Lorentz force and its application, Effects of magnetic fields on material</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
7	Students are able to describe the phenomena and applications of magnetic fields in an engineering context	<ol style="list-style-type: none"> 1. Students are able to explain the nature and sources of magnetic fields 2. Students are able to describe magnetic fields from electric currents in case studies 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Ability to describe magnetic fields and their effects on matter 2. Ability to apply the Biot-Savart law based on case information 	Discussion lecture and question and answer Case study 2 X 50	Discussion lectures and case study questions and answers	<p>Material: Basic concepts of magnetic fields and their sources, Magnetic fields due to electric currents, Lorentz force and its application, Effects of magnetic fields on material</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
8	Midterm Exam (UTS)	Able to understand the concept of quantities in physics, vectors, Coulomb's law, and electric fields	<p>Criteria: Full marks are obtained if you do all the questions correctly</p> <p>Form of Assessment : Test</p>	2 X 50		<p>Material: Vectors and scalars, electric charge, Coulomb's law, electric field.</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	20%

9	Students are able to explore and explain the principles of electric potential and their implications in the world of engineering	1.Students are able to explain the concept of electric potential 2.Students are able to apply potential concepts in case analysis	Criteria: 1.Basic understanding of electric potential and its relationship with electric fields 2.Ability to calculate potential changes based on case information Form of Assessment : Participatory Activities	Lecture and question and answer Case study 2 X 50	Lecture and question and answer Case study	Material: Concept of potential and electric potential, Relationship between electric field and electric potential, Electric potential energy, Application in electrical circuits and their components. References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%
10	Students are able to explore and explain the principles of electric potential and their implications in the world of engineering	1.Students are able to explain the concept of electric potential 2.Students are able to apply potential concepts in case analysis	Criteria: 1.Basic understanding of electric potential and its relationship with electric fields 2.Ability to calculate potential changes based on case information Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Lecture and question and answer Case study 2 X 50	Lecture and question and answer Case study	Material: Concept of potential and electric potential, Relationship between electric field and electric potential, Electric potential energy, Application in electrical circuits and their components. References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%
11	Students are able to detail the basic concepts of capacitance and communicate its relevance in engineering physics systems	1.Students are able to explain capacitance and its function 2.Students are able to design capacitors based on the case studies given	Criteria: Full marks are obtained if you do all the questions correctly Form of Assessment : Practical Assessment	Lecture, discussion Case study 2 X 50	Lectures, Case study discussions	Material: Introduction to capacitors and capacitance, Basic formulas and capacitance calculations, Types of capacitors and their applications, Capacitors in series and parallel circuits References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i>	5%

12	Students are able to communicate their understanding of the principles of inductance and its application in electrical circuits	<ol style="list-style-type: none"> 1. Students are able to define the concept of inductance 2. Students are able to calculate inductance based on the case study given 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Basic understanding of self-inductance and cross-inductance 2. Ability to apply inductance formulas to real cases <p>Form of Assessment : Participatory Activities</p>	Lecture and discussion Case study 2 X 50	Case study lectures and discussions	<p>Material: Basic principles of inductance and inductors, Self-inductance and cross-inductance, Inductance formulas and calculations, Application of inductors in AC and DC circuits</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
13	Students are able to communicate their understanding of the principles of inductance and its application in electrical circuits	<ol style="list-style-type: none"> 1. Students are able to define the concept of inductance 2. Ability to apply inductance formulas to real cases 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Basic understanding of self-inductance and cross-inductance 2. Ability to apply inductance formulas to real cases <p>Form of Assessment : Portfolio Assessment</p>	Lecture and discussion Case study 2 X 50	Case study lectures and discussions	<p>Material: Basic principles of inductance and inductors, Self-inductance and cross-inductance, Inductance formulas and calculations, Application of inductors in AC and DC circuits</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
14	Students are able to demonstrate a deep understanding of electromagnetic waves and their impact on modern technology	<ol style="list-style-type: none"> 1. Students are able to explain the properties of electromagnetic waves 2. Students are able to analyze the impact of electromagnetic waves in modern technology through case studies 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Understanding of the spectrum, properties, and applications of electromagnetic waves 2. Ability to connect the principles of electromagnetic waves with technological applications <p>Form of Assessment : Participatory Activities</p>	Lecture and discussion Case study 2 X 50	Case study lectures and discussions	<p>Material: Basic properties of electromagnetic waves, Spectrum of electromagnetic waves, Propagation of electromagnetic waves</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
15	Students are able to demonstrate a deep understanding of electromagnetic waves and their impact on modern technology	<ol style="list-style-type: none"> 1. Students are able to explain the properties of electromagnetic waves 2. Students are able to analyze the impact of electromagnetic waves in modern technology through case studies 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Understanding of the spectrum, properties, and applications of electromagnetic waves 2. Ability to connect the principles of electromagnetic waves with technological applications <p>Form of Assessment : Participatory Activities, Portfolio Assessment</p>	Lecture and discussion Case study 2 X 50	Case study lectures and discussions	<p>Material: Basic properties of electromagnetic waves, Spectrum of electromagnetic waves, Propagation of electromagnetic waves</p> <p>References: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	5%
16	Final Semester Examination (UAS)	Able to understand the concepts of potential, capacitance, inductance and electromagnetic waves	<p>Criteria:</p> <p>Full marks are obtained if you do all the questions correctly</p> <p>Form of Assessment : Test</p>	2 X 50		<p>Material: Potential, Capacitance, Inductance, Electromagnetic Waves</p> <p>Library: <i>Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.</i></p>	20%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	45%
2.	Project Results Assessment / Product Assessment	2.5%
3.	Portfolio Assessment	7.5%
4.	Practical Assessment	5%
5.	Test	40%
		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** 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.