	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
Electrical Circuits II	2020102166	Compulsory Study Program Subjects	**T=2**	**P=0**	**ECTS=3.18**	4	April 10, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Case Studies**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-5	Able to apply knowledge of mathematics, natural sciences, information technology, and engineering to gain a thorough understanding of the principles of electrical engineering
	PLO-8	Able to apply engineering principles, identify, formulate and analyze data/information to solve problems in the electrical field
	Program Objectives (PO)	
	PO - 1	Students can explain and analyze the characteristics of sinusoidal functions
	PO - 2	Students can explain and analyze values in the frequency domain (Phasor)
	PO - 3	Students can explain and analyze phasor diagrams
	PO - 4	Students can explain and analyze impedance and admittance
	PO - 5	Students can explain and analyze circuit analysis
	PO - 6	Students can explain and analyze steady state and transient conditions
	PLO-PO Matrix	

P.O	PLO-5	PLO-8
PO-1		
PO-2		
PO-3		
PO-4		
PO-5		
PO-6		

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																
PO-4																
PO-5																
PO-6																

Short Course Description	Through this lecture, the case study learning method is used, with the achievement of students being able to explain and analyze the basic concepts of the characteristics of alternating current sinusoidal functions, phasors, impedance and admittance, analysis of node and mesh circuits, superposition, Thevenin's theorem, Norton's theorem, steady state and transient conditions.	
References	**Main :**	

	1. Charles K Alexander and Matthew N. O. Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA 2. Nillson and Riedel, 2011, Electrical Circuit 9th Ed., Prentice Hall, New Jersey, USA
Supporters:	
	1. Boylestad, Robert L., 2007. Introductory Circuit Analysis -11th ed . New Jersey; Pearson Prentice Hall. 2. Floyd, 2007. Electric Circuits Fundamentals 13 7th ed. New Jersey; Pearson Prentice Hall.
Supporting lecturer	Prof. Dr. H. Munoto, M.Pd. Dr. Nur Kholis, S.T., M.T. Miftahur Rohman, 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	1. Students can explain and analyze the characteristics of sinusoidal functions 2. Students can explain and analyze sinusoidal alternating voltage (AC) electrical circuits	Ability to explain and analyze the characteristics of sinusoidal functions and sinusoidal alternating voltage (AC) electrical circuits	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Characteristics of sinusoidal functions **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** Electrical circuits with sinusoidal alternating voltage (AC) sources. **Reference:** *Nillson and Riedel, 2011, Electrical Circuit 9th Ed., Prentice Hall, New Jersey, USA*	2%
2	1. Students can explain and analyze values in the frequency domain (Phasor) 2. Students can explain and analyze changes from rectangular to polar and vice versa	Ability to explain and analyze values in the frequency domain (Phasor) as well as changes from rectangle to polar and vice versa	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Values in the frequency domain (Phasor) **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** Changes from rectangular to polar and vice versa **References:** *Nillson and Riedel, 2011, Electrical Circuit 9th Ed., Prentice Hall, New Jersey, USA*	2%
3	1. Students can explain and analyze phasor diagrams 2. Students can explain and analyze phasor diagrams for resistors	Ability to explain and analyze phasor diagrams and phasor diagrams for resistors	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Phasor diagrams **Reference:** *Floyd, 2007. Electric Circuits Fundamentals 13 7th ed. New Jersey; Pearson Prentice Hall.* **Material:** Phasor diagram for resistors **Reference:** *Floyd, 2007. Electric Circuits Fundamentals 13 7th ed. New Jersey; Pearson Prentice Hall.*	2%

4	Students can explain and analyze phasor diagrams for inductors	Ability to explain and analyze phasor diagrams for inductors	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Phasor diagram for inductors **Reference:** *Floyd, 2007. Electric Circuits Fundamentals 13 7th ed. New Jersey; Pearson Prentice Hall.*	2%
5	Students can explain and analyze phasor diagrams for capacitors	Ability to explain and analyze phasor diagrams for capacitors	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Phasor diagram for capacitors **Reference:** *Floyd, 2007. Electric Circuits Fundamentals 13 7th ed. New Jersey; Pearson Prentice Hall.*	2%
6	1. Students can explain and analyze impedance and admittance 2. Students can explain and analyze Z Impedance	1. Ability to explain and analyze impedance and admittance 2. Ability to explain and analyze Z Impedance	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Impedance and admittance **Reference:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** Impedance Z **Bibliography:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA*	2%
7	1. Students can explain and analyze impedance in series circuits 2. Students can explain and analyze impedance in parallel circuits	1. Ability to explain and analyze impedance in series circuits 2. Ability to explain and analyze impedance in parallel circuits	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Impedance in series circuits **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA* **Material:** Impedance in parallel circuits **Reference:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA*	2%

8	Mid-term exam with material from Meeting 1 to Meeting 7	Full marks are obtained if you do all the questions correctly	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Test	Written exam 2 X 50 minutes	Written exam 2 X 50 minutes	**Material:** Questions **Library:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** **Library** Questions : *Nillson and Riedel, 2011, Electrical Circuit 9th Ed., Prentice Hall, New Jersey, USA* **Material:** **Library** Questions : *Boylestad, Robert L., 2007. Introductory Circuit Analysis - 11th ed. New Jersey; Pearson Prentice Hall.*	20%
9	1.Students can explain and analyze current divider circuits 2.Students can explain and analyze Admittance Y	1.Ability to explain and analyze current divider circuits 2.Ability to explain and analyze Admittance Y	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Current divider circuits **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA* **Material:** Admittance Y **Reference:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA*	2%
10	1.Students can explain and analyze circuit analysis 2.Students can explain and analyze node analysis 3.Students can explain and analyze loop/mesh analysis	1.Ability to explain and analyze circuit analysis 2.Ability to explain and analyze node/point/node/nodal analysis 3.Ability to explain and analyze loop/mesh analysis	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Circuit analysis **Bibliography:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA* **Material:** Vertex/node/nodal analysis **Reference:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** Loop/mesh analysis **Bibliography:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA*	1%

11	1. Students can explain and analyze Superposition 2. Students can explain and analyze Thevenin's Theorem 3. Students can explain and analyze Norton's Theorem	1. Ability to explain and analyze Superposition 2. Ability to explain and analyze Thevenin's Theorem 3. Ability to explain and analyze Norton's Theorem	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Circuit analysis **Bibliography:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA* **Material:** Vertex/node/nodal analysis **Reference:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** Loop/mesh analysis **Bibliography:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA*	1%
12	1. Students can explain and analyze steady state and transient conditions 2. Students can explain and analyze the working principles of transeints in RLC circuits	1. Ability to explain and analyze steady state and transient conditions 2. Ability to explain and analyze the working principles of transeint in RLC circuits	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** steady state and transient conditions. **Bibliography:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** transeint working principles in RLC circuits **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA*	1%
13	Students can explain and analyze Steady State and Transient Conditions (Initial Conditions and Properties of Circuit Elements When Transient)	Ability to explain and analyze Steady State and Transient Conditions (Initial Conditions and Properties of Circuit Elements When Transient)	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Steady State and Transient Conditions (Initial Conditions and Properties of Circuit Elements When Transienting) **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA*	1%

14	Students can explain and analyze the initial conditions of a derivative (steady state conditions)	Ability to explain and analyze the initial conditions of a derivative (steady state conditions)	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Project Results Assessment / Product Assessment	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Initial Conditions of a Derivative (steady state conditions) **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA*	15%
15	Students can explain and analyze transients in parallel RLC circuits with unit step sources and transient circuits with exponential function sources.	Ability to explain and analyze transients in parallel RLC circuits with unit step sources and transient circuits with exponential function sources	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Project Results Assessment / Product Assessment	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Transients in Parallel RLC Circuits with Unit Step Sources and Transient Circuits with Exponential Function Sources **References:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuits 5th Ed., McGraw-Hill, New York, USA*	15%
16	Final Semester Exam with material from Meeting 1 to Meeting 15	Full marks are obtained if you do all the questions correctly	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Test	Written Exam 2 X 50 minutes	Written Exam 2 X 50 minutes	**Material:** Questions **Library:** *Charles K Alexander and Matthew NO Sadiku, 2013, Fundamentals of Electric Circuit 5th Ed., McGraw-Hill, New York, USA* **Material:** **Library** Questions : *Nillson and Riedel, 2011, Electrical Circuit 9th Ed., Prentice Hall, New Jersey, USA*	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	20%
2.	Project Results Assessment / Product Assessment	30%
3.	Test	50%
		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.