	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
CALCULUS	2020103317	Compulsory Study Program Subjects	T=0	P=0	ECTS=0	1	April 10, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dr. Tri Rijanto, M.Pd., M.T. ; Dr. Raden Roro Hapsari Peni Agustin Tjahyaningtijas, S.Si., M.T. ; Miftahur Rohman, S.T., M.T. ; Yuli Sutoto Nugroho, S.Pd., M.Pd. dan 2 lainnya	Prof. Dr. I Gusti Putu Asto B., 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 apply knowledge of mathematics, natural sciences, information technology, and electrical engineering to gain a thorough understanding of engineering principles

PLO-PO Matrix

P.O
PO-1

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																

Short Course Description	Understanding the concepts of various methods of indefinite integration, definite integrals and integral applications in the field of civil engineering, namely to find the area, volume of rotating objects, arc length, shell area of rotating objects, center of gravity and moment of inertia. Able to understand the definition of multivariable functions, differentiate partially and determine the total derivative and its application in the field of civil engineering as well as perform double and triple integrals with its application in the field of civil engineering

References

Main :

1. 1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud K.A, Matematika Teknik, Erlangga 2001

Supporters:

1. Anton, H. dkk, Calculus, 10-th edition, John Wiley & Sons, New York, 2012

Supporting lecturer	Dr. Tri Rijanto, M.Pd., M.T. Dr. Raden Roro Hapsari Peni Agustin Tjahyaningtijas, S.Si., M.T. Dr. Lilik Anifah, S.T., M.T. Miftahur Rohman, S.T., M.T. Pradini Puspitaningayu, S.T., M.T., Ph.D. Yuli Sutoto Nugroho, S.Pd., M.Pd.

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. Understand the concept of Sets and functions.2. Able to identify, formulate, analyze and solve problems based on the concept of Sets and functions in the field of Electrical Engineering.	1. Students understand the concept of Sets and functions.2. Students are able to identify, formulate, analyze and solve problems based on the concept of Sets and functions when given problems in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct Instruction and Problem Based Learning 3 X 50		**Material:** Meeting material 1 **Bibliography:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	3%
2	1. Understand the concept of Sets and functions.2. Able to identify, formulate, analyze and solve problems based on the concept of Sets and functions in the field of Electrical Engineering.	1. Students understand the concept of Sets and functions.2. Students are able to identify, formulate, analyze and solve problems based on the concept of Sets and functions when given problems in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct Instruction and Problem Based Learning 3 X 50		**Material:** Meeting material 2 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	3%
3	Understand the concepts of linear, quadratic functions and graphs, and simple function sketches. Able to identify, formulate, analyze and solve problems based on the concept of functional functions and linear, quadratic graphs and simple function sketches in the field of Electrical Engineering.	Students understand by discussing the concept of linear, quadratic functions and graphs and simple function sketches. Students are able to identify, formulate, analyze and solve problems based on the concept of functional functions and linear, quadratic graphs and simple function sketches in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct online learning and problem based learning 3 X 50		**Material:** Meeting material 3 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	3%

4	Understand the concepts of linear, quadratic functions and graphs, and simple function sketches. Able to identify, formulate, analyze and solve problems based on the concept of functional functions and linear, quadratic graphs and simple function sketches in the field of Electrical Engineering.	Students understand by discussing the concept of linear, quadratic functions and graphs and simple function sketches. Students are able to identify, formulate, analyze and solve problems based on the concept of functional functions and linear, quadratic graphs and simple function sketches in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct online learning and problem based learning 3 X 50		**Material:** Meeting material 4 **Bibliography:** *Anton, H. et al, Calculus, 10-th edition, John Wiley & Sons, New York, 2012*	3%
5	1. Understand the concept of Boolean algebra.2. Able to identify, formulate, analyze and solve problems based on the concept of Boolean algebra in the field of Electrical Engineering.	1. Students are able to understand the concept of Boolean algebra.2. Students are able to identify, formulate, analyze and solve problems based on the concept of Boolean algebra in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 5 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	3%
6	1. Understand the concept of trigonometric and wave functions.2. Able to identify, formulate, analyze and solve problems based on concepts about trigonometry and wave functions in the field of Electrical Engineering.	1. Students are able to explain the concept of trigonometry and wave functions.2. Students are able to identify, formulate, analyze and solve problems based on concepts about trigonometry and wave functions in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 7 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	3%

7	1. Understand the concept of trigonometric and wave functions.2. Able to identify, formulate, analyze and solve problems based on concepts about trigonometry and wave functions in the field of Electrical Engineering.	1. Students are able to explain the concept of trigonometry and wave functions.2. Students are able to identify, formulate, analyze and solve problems based on concepts about trigonometry and wave functions in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting 7 materials **Bibliography:** *Anton, H. et al, Calculus, 10-th edition, John Wiley & Sons, New York, 2012*	3%
8	UTS	UTS	**Criteria:** Evaluation Rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	written test 3 X 50		**Material:** Meeting material 1-7 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	20%
9	1. Understand the concept of exponential functions.2. Able to identify, formulate, analyze and solve problems based on the concept of exponential functions in the field of Electrical Engineering.	1. Students are able to explain the concept of exponential functions.2. Students are able to identify, formulate, analyze and solve problems based on the concept of exponential functions in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 9 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	4%
10	1. Understand the concept of exponential functions.2. Able to identify, formulate, analyze and solve problems based on the concept of exponential functions in the field of Electrical Engineering.	1. Students are able to explain the concept of exponential functions.2. Students are able to identify, formulate, analyze and solve problems based on the concept of exponential functions in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** 10th meeting material **Bibliography:** *Anton, H. et al, Calculus, 10-th edition, John Wiley & Sons, New York, 2012*	4%

11	1. Understand the concept of vectors.2. Able to identify, formulate, analyze and solve problems based on the concept of vectors, in the field of Electrical Engineering.	1. Students are able to explain the concept of vectors.2. Students are able to identify, formulate, analyze and solve problems based on the concept of vectors, in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 11 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	4%
12	1. Understand the concept of complex numbers.2. Able to identify, formulate, analyze and solve problems based on the concept of complex numbers in the field of Electrical Engineering.	1. Students are able to explain complex numbers.2. Students are able to identify, formulate, analyze and solve problems based on the concept of complex numbers in the field of Electrical Engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** 12th meeting material **Bibliography:** *Anton, H. et al, Calculus, 10-th edition, John Wiley & Sons, New York, 2012*	4%
13	1. Understand the concept of differential and integral.2. Able to identify, formulate, analyze and solve problems based on concepts of differential and integral in the field of electrical engineering.	1. Students are able to explain the concept of differential and integral.2. Students are able to identify, formulate, analyze and solve problems based on concepts of differential and integral in the field of electrical engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 13 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	4%
14	1. Understand the concept of differential and integral.2. Able to identify, formulate, analyze and solve problems based on concepts of differential and integral in the field of electrical engineering.	1. Students are able to explain the concept of differential and integral.2. Students are able to identify, formulate, analyze and solve problems based on concepts of differential and integral in the field of electrical engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 14 **Bibliography:** *Anton, H. et al, Calculus, 10-th edition, John Wiley & Sons, New York, 2012*	4%

15	1. Understand the concept of differential and integral.2. Able to identify, formulate, analyze and solve problems based on concepts of differential and integral in the field of electrical engineering.	1. Students are able to explain the concept of differential and integral.2. Students are able to identify, formulate, analyze and solve problems based on concepts of differential and integral in the field of electrical engineering.	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Direct instruction and doing the 3 X 50 exercise		**Material:** Meeting material 14 **References:** *1. Attenborough Mary, Mathematics for Electrical Engineering and Computing, f Elsevier Linacre House, Jordan Hill, Oxford, 2003 2. Stroud KA, Engineering Mathematics, Erlangga 2001*	4%
16		Evaluation Rubric	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities, Tests	Writing test			30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	68.67%
2.	Project Results Assessment / Product Assessment	8.67%
3.	Test	21.67%
		99.01%

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.