	Universitas Negeri Surabaya Vocational Faculty, D4 Electrical Engineering Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Advanced Engineering Mathematics	99992040102031		T=2	P=0	ECTS=3.18	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Mahendra Widyartono, 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 master the theoretical concepts of Complex Numbers, Matrices, Systems of Linear Equations, Vectors, Laplace Transformation, and Z Transformation.
	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	This course discusses Complex Numbers, Matrices, Systems of Linear Equations, Vectors, Laplace Transformation, and Z Transformation.
References	**Main :**
	1. 1. Mursita, Danang. 2011. Matematika untuk Perguruan Tinggi . . Bandung: Rekayasa Sains. 2. K.A. Stroud. 2015. Matematika untuk Teknik. Bandung: Erlangga
	Supporters:
Supporting lecturer	Dr. Lilik Anifah, S.T., M.T. Handini Novita Sari, S.Pd., 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	After following the lecture process, students can understand and solve simple engineering problems using Complex Numbers	After following the lecture process, students can: 1. Can provide solutions to problems given about Complex Numbers	**Criteria:** max score100 **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Questions and answers and assignments Model: Cooperative Learning Strategy: Assignments, group work, Active during PBM 2 X 50		**Material:** Matrices and determinants **References:**	5%
2	After following the lecture process, students can solve simple engineering problems using Complex Numbers	After following the lecture process, students can provide solutions to simple engineering problems using Complex Numbers	**Criteria:** max score100 **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Questions and answers and assignments Model: Cooperative Learning Strategy: Assignments, group work, Active during PBM 2 X 50		**Material:** Matrices and determinants **References:** *1. Mursita, Danang. 2011. Mathematics for Higher Education. . Bandung: Science Engineering. 2. Stroud Train. 2015. Mathematics for Engineering. Bandung: Erlangga*	5%
3	After following the lecture process, students can understand the Matrices, and determinants material. Students can solve simple engineering problems using Matrices, and determinants	After following the lecture process, students can:- Students can answer problems/questions about matrices and determinants- Students can solve simple technical problems using Matrices, and determinants	**Criteria:** max score100 **Form of Assessment** : Test	Approach: Scientific Method: Questions and answers and assignments Model: Cooperative Learning Strategy: Assignments, group work, Active during PBM 2 X 50			5%
4	1. Students can determine the first and second partial derivatives2. Students can determine the extreme values of a multivariable function 3. Students can determine extreme values with Lagrange multipliers	1. Students can determine the first and second partial derivatives2. Students can determine the extreme values of a multivariable function 3. Students can determine extreme values with Lagrange multipliers	**Criteria:** Maximum score 100 **Form of Assessment** : Test	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			5%
5	1. Students can determine the first and second partial derivatives2. Students can determine the extreme values of a multivariable function 3. Students can determine extreme values with Lagrange multipliers	1. Students can determine the first and second partial derivatives2. Students can determine the extreme values of a multivariable function 3. Students can determine extreme values with Lagrange multipliers	**Criteria:** Maximum score 100 **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			5%

6	1. Students can calculate double and triple integrals2. Students can determine the limits of integration if the integrators are swapped 3. Students can apply it in the engineering field to Double Integral material	1. Students can calculate double and triple integrals2. Students can determine the limits of integration if the integrators are swapped 3. Students can apply it in the engineering field to Double Integral material	**Criteria:** Max score 100 **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			5%
7	1. Students can calculate double and triple integrals2. Students can determine the limits of integration if the integrators are swapped 3. Students can apply it in the engineering field to Double Integral material	1. Students can calculate double and triple integrals2. Students can determine the limits of integration if the integrators are swapped 3. Students can apply it in the engineering field to Double Integral material	**Criteria:** Max score 100 **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			10%
8	1. Students can calculate double and triple integrals2. Students can determine the limits of integration if the integrators are swapped 3. Students can apply it in the engineering field to Double Integral material	1. Students can calculate double and triple integrals2. Students can determine the limits of integration if the integrators are swapped 3. Students can apply it in the engineering field to Double Integral material	**Criteria:** Max score 100 **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			10%
9	Can understand all the material in meetings 1 to 8	Can understand all the material in meetings 1 to 8	**Criteria:** Maximum score 100 **Form of Assessment** : Participatory Activities	Sub Summative Exam 2 X 50			5%
10	After students have attended the lecture, then: 1. Students can determine the Laplace transform of the given functions 2. Students can determine the inverse TL	After students have attended the lecture, then: 1. Students can determine the Laplace transform of the given functions 2. Students can determine the inverse TL	**Criteria:** Max score 100	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			0%
11	After students have attended the lecture, then: 1. Students can determine the Laplace transform of the given functions 2. Students can determine the inverse TL	After students have attended the lecture, then: 1. Students can determine the Laplace transform of the given functions 2. Students can determine the inverse TL	**Criteria:** Max score 100 **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			5%

12	After students have attended the lecture, then: 1. Students can determine the Laplace transform of the given functions 2. Students can determine the inverse TL	After students have attended the lecture, then: 1. Students can determine the Laplace transform of the given functions 2. Students can determine the inverse TL	**Criteria:** Max score 100	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			0%
13	Students can: 1. Fourier Series and Fourier Transform2. Applying Fourier Series theory	Students can: 1. Fourier Series and Fourier Transform2. Applying Fourier Series theory	**Criteria:** Max score 100	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			0%
14	Students can: 1. Fourier Series and Fourier Transform2. Applying Fourier Series theory	Students can: 1. Fourier Series and Fourier Transform2. Applying Fourier Series theory	**Criteria:** Max score 100 **Form of Assessment** : Test	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			10%
15	Students can: 1. Fourier Series and Fourier Transform2. Applying Fourier Series theory	Students can: 1. Fourier Series and Fourier Transform2. Applying Fourier Series theory	**Criteria:** Max score 100 **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer and assignment Model: Cooperative Learning Strategy: Assignments, group work, Activeness during PBM 2 X 50			15%
16			**Form of Assessment** : Project Results Assessment / Product Assessment				15%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	20%
2.	Project Results Assessment / Product Assessment	60%
3.	Test	20%
		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** 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.
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.