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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Basic Engineering Mathematics	20401022996		T=0	P=0	ECTS=0	1	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	. Understand the concepts of Sets and functions, functions and graphs, Boolean algebra, trigonometric and wave functions, exponential functions, vectors, complex numbers, differentials and integrals.

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 Real Functions, Limits and Rates of Change, Derivatives, Applications of Differentiation, Integrals, Applications of Integrals, Transcendent Functions, Integration Techniques.

References

Main :

1. 1. Danang Mursita. (2011). Matematika untuk Perguruan Tinggi. Rekayasa Sains: Bandung. 2. James Stewart. (2001). KALKULUS. Jilid 1, Alih Bahasa: I Nyoman Susila, Hendra Gunawan. Penerbit Erlangga: Jakarta.

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	Explanation of learning signs for the 2018-2019 odd semester lectures including how to assess them. Able to solve the Real Number System, Algebraic Inequalities and Absolute Values as well as Functions and graphs	1. Solving rational split inequalities 2. Solving absolute inequalities 3. Determining the domain, range, and drawing graphs with shifts from known functions (algebraic and trigonometric functions) 4. Calculating/determining algebraic and trigonometric limits.	**Criteria:** 1.1. Maximum scoring of 100 for each formative test or PTS and PAS 2.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 3.3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Model/Method: Approach: Scientific Method: Question and answer, discussion and assignment Model: Direct learning model Strategy: assignment and presentation in turns. 2 X 50			5%
2	Explanation of learning signs for the 2018-2019 odd semester lectures including how to assess them. Able to solve the Real Number System, Algebraic Inequalities and Absolute Values as well as Functions and graphs	1. Solving rational split inequalities 2. Solving absolute inequalities 3. Determining the domain, range, and drawing graphs with shifts from known functions (algebraic and trigonometric functions) 4. Calculating/determining algebraic and trigonometric limits.	**Criteria:** 1.1. Maximum scoring of 100 for each formative test or PTS and PAS 2.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 3.3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Model/Method: Approach: Scientific Method: Question and answer, discussion and assignment Model: Direct learning model Strategy: assignment and presentation in turns. 2 X 50			5%
3	1. Able to solve function derivatives using limit definitions. 2. Able to determine the first derivative using function derivative formulas 3. Able to solve high level derivatives 4. Able to solve the derivative of a function for implicit functions 5. Able to apply function derivative theory to solve speed & acceleration problems. 6. Able to apply function derivative theory to solve tangent gradient problems, tangent line equations and normal lines 7. Able to apply function derivative theory to solve infinite limit problems	1. Solve the derivative of the function using the limit definition. 2. Determine the first derivative using function derivative formulas 3. Solve high level derivatives 4 Solve the derivative of a function for implicit functions 5. Apply function derivative theory to solve speed & acceleration problems. 6. Apply function derivative theory to solve tangent gradient problems, tangent line equations and normal lines 7. Apply function derivative theory to solve infinite limit problems	**Criteria:** 1.Assessment Criteria: 2.1. Maximum scoring of 100 for each formative test or PTS and PAS 3.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 4.3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Question and answer, discussion and assignment Model: Direct learning model Strategy: assignment and presentation in turns. 3 X 50			5%

4	1. Able to solve function derivatives using limit definitions. 2. Able to determine the first derivative using function derivative formulas 3. Able to solve high level derivatives 4. Able to solve the derivative of a function for implicit functions 5. Able to apply function derivative theory to solve speed & acceleration problems. 6. Able to apply function derivative theory to solve tangent gradient problems, tangent line equations and normal lines 7. Able to apply function derivative theory to solve infinite limit problems	1. Solve the derivative of the function using the limit definition. 2. Determine the first derivative using function derivative formulas 3. Solve high level derivatives 4 Solve the derivative of a function for implicit functions 5. Apply function derivative theory to solve speed & acceleration problems. 6. Apply function derivative theory to solve tangent gradient problems, tangent line equations and normal lines 7. Apply function derivative theory to solve infinite limit problems	**Criteria:** 1.Assessment Criteria: 2.1. Maximum scoring of 100 for each formative test or PTS and PAS 3.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 4.3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Question and answer, discussion and assignment Model: Direct learning model Strategy: assignment and presentation in turns. 3 X 50			5%
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6	Group Presentation 1 - 3 (related to real numbers, rational fractional inequalities and absolute values) Group 4 - 6 Presentation (related to graphs of functions, implicit and explicit first derivatives, and higher order derivatives) Group Presentation 7 - 9 (related to derivative applications)	Group Presentation 1 - 3 (related to real numbers, rational fractional inequalities and absolute values) Group 4 - 6 Presentation (related to graphs of functions, implicit and explicit first derivatives, and higher order derivatives) Group Presentation 7 - 9 (related to derivative applications)	**Criteria:** 1.Assessment Criteria: 2.1. Maximum scoring of 100 for each formative test or PTS and PAS 3.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 4.3. Minimum attendance requirement is 75% **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer, discussion and assignment Model: Cooperative Learning Model Strategy: assignment and presentation in turns. 2 X 50			5%

7	Group Presentation 1 - 3 (related to real numbers, rational fractional inequalities and absolute values) Group 4 - 6 Presentation (related to graphs of functions, implicit and explicit first derivatives, and higher order derivatives) Group Presentation 7 - 9 (related to derivative applications)	Group Presentation 1 - 3 (related to real numbers, rational fractional inequalities and absolute values) Group 4 - 6 Presentation (related to graphs of functions, implicit and explicit first derivatives, and higher order derivatives) Group Presentation 7 - 9 (related to derivative applications)	**Criteria:** 1. Assessment Criteria: 2. 1. Maximum scoring of 100 for each formative test or PTS and PAS 3. 2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 4. 3. Minimum attendance requirement is 75% **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer, discussion and assignment Model: Cooperative Learning Model Strategy: assignment and presentation in turns. 2 X 50			10%
8	Group Presentation 1 - 3 (related to real numbers, rational fractional inequalities and absolute values) Group 4 - 6 Presentation (related to graphs of functions, implicit and explicit first derivatives, and higher order derivatives) Group Presentation 7 - 9 (related to derivative applications)	Group Presentation 1 - 3 (related to real numbers, rational fractional inequalities and absolute values) Group 4 - 6 Presentation (related to graphs of functions, implicit and explicit first derivatives, and higher order derivatives) Group Presentation 7 - 9 (related to derivative applications)	**Criteria:** 1. Assessment Criteria: 2. 1. Maximum scoring of 100 for each formative test or PTS and PAS 3. 2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 4. 3. Minimum attendance requirement is 75% **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Method: Question and answer, discussion and assignment Model: Cooperative Learning Model Strategy: assignment and presentation in turns. 2 X 50			10%
9	Mid-Semester Assessment (PTS) Material for Meetings 1 to 8	Mid-Semester Assessment (PTS) Material for Meetings 1 to 8	**Criteria:** 1. Assessment Criteria: 2. 1. Maximum scoring of 100 for each formative test or PTS and PAS 3. 2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 4. 3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Mid-Semester Assessment (PTS) Meeting Materials 1 to 8 1 X 50			5%

10	- Students can determine integrals as anti-derivatives in indefinite integrals - Students can determine definite integrals and can determine the properties of an integral whether definite or indefinite. - Students can determine integrals using existing formulas, both algebraic integral formulas and trigonometric functions	- Students can determine integrals as anti-derivatives in indefinite integrals - Students can determine definite integrals and can determine the properties of an integral whether definite or indefinite. - Students can determine integrals using existing formulas, both algebraic integral formulas and trigonometric functions	**Criteria:** 1.1. Maximum scoring of 100 for each formative test or PTS and PAS 2.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 3.3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Question and answer, discussion and assignment Model: Direct learning model Strategy: assignment and presentation in turns. 4 X 50			5%
11	- Students can determine integrals as anti-derivatives in indefinite integrals - Students can determine definite integrals and can determine the properties of an integral whether definite or indefinite. - Students can determine integrals using existing formulas, both algebraic integral formulas and trigonometric functions	- Students can determine integrals as anti-derivatives in indefinite integrals - Students can determine definite integrals and can determine the properties of an integral whether definite or indefinite. - Students can determine integrals using existing formulas, both algebraic integral formulas and trigonometric functions	**Criteria:** 1.1. Maximum scoring of 100 for each formative test or PTS and PAS 2.2. Follow the UNESA scoring format: participation (2), Assignments (3), PTS (2) and PS (3) 3.3. Minimum attendance requirement is 75% **Form of Assessment** : Participatory Activities	Approach: Scientific Method: Question and answer, discussion and assignment Model: Direct learning model Strategy: assignment and presentation in turns. 4 X 50			5%
12	- Students can determine integrals as anti-derivatives in indefinite integrals - Students can determine definite integrals and can determine the properties of an integral whether definite or indefinite. - Students can determine integrals using existing formulas, both algebraic integral formulas and trigonometric functions	- Students can determine questions related to integrals, discuss assignments in groups - Determine the activity for each group in the presentation. - Students can determine integrals using integral techniques by characterizing the characteristics of the problem	**Form of Assessment** : Participatory Activities	2 X 50			5%
13	- Students can determine questions related to integrals, discuss assignments in groups - Determine the activity for each group in the presentation. - Students can determine integrals using integral techniques by characterizing the characteristics of the problem	- Students can determine questions related to integrals, discuss assignments in groups - Determine the activity for each group in the presentation. - Students can determine integrals using integral techniques by characterizing the characteristics of the problem, both algebraic integral formulas and exponential and inverse functions	**Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	2 X 50			5%

14	- Students can determine questions related to integrals, discuss assignments in groups - Determine the activity for each group in the presentation. - Students can determine integrals using integral techniques by characterizing the characteristics of the problem, both algebraic integral formulas and exponential and inverse functions	- Students can determine questions related to integrals, discuss assignments in groups - Determine the activity for each group in the presentation. - Students can determine integrals using integral techniques by characterizing the characteristics of the problem	**Form of Assessment** : Project Results Assessment / Product Assessment	2 X 50			10%
15	- Students can determine the application of the integral to the area of a flat plane to the %2 axis (pian to the %2 axis) - Students can determine the application of the integral to the area of a flat plane to the y-axis (pian to the y-axis) - Students can determine the application of the integral to the volume of a rotating object to axis%2 (pias to axis%2) -- Students can determine the application of the integral to the volume of a rotating object to the y-axis (pias to the y-axis) - Students can determine the application of the integral to the length of a curve, both ordinary functions, parameters	- Students can determine the application of the integral to the area of a flat plane to the %2 axis (pian to the %2 axis) - Students can determine the application of the integral to the area of a flat plane to the y-axis (pian to the y-axis) - Students can determine the application of the integral to the volume of a rotating object to axis%2 (pias to axis%2) -- Students can determine the application of the integral to the volume of a rotating object to the y-axis (pias to the y-axis) - Students can determine the application of the integral to the length of a curve, both ordinary functions, parameters		2 X 50			0%
16	- Students can determine the application of the integral to the area of a flat plane to the %2 axis (pian to the %2 axis) - Students can determine the application of the integral to the area of a flat plane to the y-axis (pian to the y-axis) - Students can determine the application of the integral to the volume of a rotating object to axis%2 (pias to axis%2) -- Students can determine the application of the integral to the volume of a rotating object to the y-axis (pias to the y-axis) - Students can determine the application of the integral to the length of a curve, both ordinary functions, parameters	- Students can determine the application of the integral to the area of a flat plane to the %2 axis (pian to the %2 axis) - Students can determine the application of the integral to the area of a flat plane to the y-axis (pian to the y-axis) - Students can determine the application of the integral to the volume of a rotating object to axis%2 (pias to axis%2) -- Students can determine the application of the integral to the volume of a rotating object to the y-axis (pias to the y-axis) - Students can determine the application of the integral to the length of a curve, both ordinary functions, parameters	**Form of Assessment** : Project Results Assessment / Product Assessment	2 X 50			15%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	42.5%

2.	Project Results Assessment / Product Assessment	57.5%
		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.