



**Universitas Negeri Surabaya
Vocational Faculty,
D4 Civil Engineering Study Program**

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date												
Applied mathematics	99992240102011		T=2 P=0 ECTS=3.18	1	July 17, 2024												
AUTHORIZATION		SP Developer	Course Cluster Coordinator	Study Program Coordinator													
		Puguh Novi Prasetyono, S.Pd., M.T.													
Learning model	Case Studies																
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																
	PLO-11	Able to apply knowledge of mathematics, natural and/or materials science, civil engineering information technology to gain a thorough understanding of the principles and methods of civil engineering in the field of building construction.															
	Program Objectives (PO)																
	PLO-PO Matrix																
		P.O	PLO-11														
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
Short Course Description	Study of the basics of mathematics through understanding the concepts of theorems and their application to various problems including real number systems, complexes, vectors, functions, function limits, graphs of functions, polar coordinates, derivatives of functions along with their application to straight line equations, minimum maximum values and associated rate changes so that students can apply it in the civil field.																
References	Main :																
	<ol style="list-style-type: none"> 1. Louis Leithold, 1991, Kalkulus dan Ilmu Ukur Analitik, edisi 5, Jakarta : Erlangga. 2. L. Susskind, G. Hrabovsky, 2013, The Theoretical Minimum, New York : Basic Book 3. Purcell dan Verberg, 1992, Kalkulus dan Geometri Analitis, Jakarta: Erlangga 4. Stroud, K.A, 1986, [alih bahasa oleh Erwin Sucipto], Matematika Untuk Teknik, Penerbit: Erlangga ,Jakarta. 5. Baisuni , M.H. , 1986 , Kalkulus , Jakarta : Universitas Indonesia 																
	Supporters:																
Supporting lecturer	Ninik Wahyu Hidajati, S.Si., M.Si.																
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	Able to explain number systems starting from the simplest numbers to the most complex numbers, power numbers, radicals and mathematical operations, equations and inequalities	· Explain the types of numbers starting from the simplest numbers to the most complex numbers · Explain the power numbers, radicals and their mathematical operations. Explain and be able to solve equations and inequalities	Criteria: Perfect score if answered well and correctly	Brainstorming, discussion and problem-based learning 2 X 50			0%										

2	Understand the definition of vectors and relations and vector algebra operations, and be able to calculate the angle formed by 2 vectors, calculate the area of a parallelogram and be able to calculate the volume of a parallelepipedum	1. Explain the definition of vectors and relations and vector algebra operations 2. Calculating the angle formed by 2 vectors, calculating the area of a parallelogram and calculating the volume of a parallelepipedum	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
3	Understand the definition of vectors and relations and vector algebra operations, and be able to calculate the angle formed by 2 vectors, calculate the area of a parallelogram and be able to calculate the volume of a parallelepipedum	1. Explain the definition of vectors and relations and vector algebra operations 2. Calculating the angle formed by 2 vectors, calculating the area of a parallelogram and calculating the volume of a parallelepipedum	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
4	Able to define functions, understand various functions, be able to draw function graphs, determine the origin area (domain) and result area (function), understand graph shifts, calculate function operations and function composition and be able to draw function graphs in polar coordinates	· Explain the definition of function · Explain the various functions · Draw function graphs, determine the domain and function areas · Draw function graphs using the law of translation/shift · Explain the emergence of new functions based on the operation of functions and function composition · Explain the depiction of function graphs in polar coordinates	Criteria: : Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
5	Able to define functions, understand various functions, be able to draw function graphs, determine the origin area (domain) and result area (function), understand graph shifts, calculate function operations and function composition and be able to draw function graphs in polar coordinates	· Explain the definition of function · Explain the various functions · Draw function graphs, determine the domain and function areas · Draw function graphs using the law of translation/shift · Explain the emergence of new functions based on the operation of functions and function composition · Explain the depiction of function graphs in polar coordinates	Criteria: : Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
6	Able to solve function limits Able to solve function limits	· Explain the definition of limits · Explain limit theorems · Explain the limits of trigonometric functions · Explain the limits of rational numbers · Explain the limits of indeterminate numbers · Explain the limits of exponential numbers	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
7	Able to understand the continuity of function at one point	Proving the condition that the function is continuous at one point	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
8	U.S.S	-	Criteria: -	- 2 X 50			0%

9	Understand the definition and properties of derivatives and be able to find derivatives of various functions	· Explain the definition of derivatives and derivative properties · Explain derivatives using the chain rule, higher order derivatives, implicit function derivatives and parameter function derivatives	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
10	Understand the definition and properties of derivatives and be able to find derivatives of various functions	· Explain the definition of derivatives and derivative properties · Explain derivatives using the chain rule, higher order derivatives, implicit function derivatives and parameter function derivatives	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
11	Able to understand the application of the derivative of a function	Explain the application of the derivative of a function to the velocity of solid particles, liquid velocity, extreme values (maximum-minimum) and the associated rate of change	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
12	Able to understand the application of the derivative of a function	Explain the application of the derivative of a function to the velocity of solid particles, liquid velocity, extreme values (maximum-minimum) and the associated rate of change	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
13	· Solve integrals of various functions and techniques in integration. Able to solve integrals with boundary conditions	Integral analysis of various functions and techniques in integration	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
14	· Solve integrals of various functions and techniques in integration. Able to solve integrals with boundary conditions	Integral analysis of various functions and techniques in integration	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
15	· Able to apply Certain Integrals to calculate Area of Land, Volume of Rotating Objects, arc length, skin area of rotating objects, center of gravity and moment of inertia	· Calculate the Area of a Rotating Object, Volume of a Rotating Object, arc length, skin area of a rotating object, center of gravity and moment of inertia	Criteria: Perfect score if answered well and correctly	Problem-based learning and discussion 2 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.