	Universitas Negeri Surabaya Vocational Faculty, D4 Transportation Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Applied mathematics	3930102040		T=2	P=0	ECTS=3.18	1	July 16, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Anita Susanti, S.Pd., M.T.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

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 concept of theorems and their application to various transportation engineering problems, which include real number systems, linear equations, vectors, functions, derivatives of functions along with their application to straight line equations, minimum maximum values and related rate changes, integrals and their application to calculating areas and road length and matrices for calculating vehicle volume and other problems in the transportation sector
References	**Main :**
	1. [1].Louis Leithold, 1991, Kalkulusdan Ilmu Ukur Analitik, edisi 5, Jakarta: Erlangga[2] L.Susskind, G. Hrabovsky, 2013, The Theorictical Minimum, New York : Basic Book[3]. Purcell dan Verberg,1992,Kalkulus dan Geometri Analitis, Jakarta: Erlangga[4]. Stroud, K.A, 1986, [alih bahasa oleh ErwinSucipto], Matematika Untuk Teknik,Penerbit: Erlangga ,Jakarta. [5]. Baisuni , M.H. , 1986 , Kalkulus ,Jakarta : Universitas Indonesia
	Supporters:
Supporting lecturer	Ninik Wahju Hidajati, S.Si., M.Si. Lynda Refnitasari, S.Si., M.URP

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, and able to calculate powers, radicals and mathematical operations, equations and inequalities and able to apply them in the field of transportation science	1. Explain the types of numbers starting from the simplest numbers to the most complex numbers 2. Explains power numbers, radicals and their mathematical operations. 3. Explain and be able to solve equations and inequalities	**Criteria:** Full marks are obtained if you do all the questions correctly	Brainstorming, discussion and problem-based learning 6 X 50			0%
2							0%
3	Able to explain the definition of vectors, relations and be able to calculate vector algebra operations, angles formed by 2 vectors and be able to apply them in the field of transportation science	1. Explains the definition of vectors and relations and vector algebra operations 2. Calculate the angle formed by two vectors.	**Criteria:** Full marks are obtained if you do all the questions correctly	Problem-based learning and discussion 6 X 50			0%
4							0%
5	Able to explain the definition of function, understand various functions, be able to draw function graphs, determine the area of origin (domain) and result area (function), understand shift graphs, and be able to apply it in the field of transportation	1. Explain the definition of function 2. Explain the various functions 3. Draw function graphs, determine domain areas and function areas 4. Draw function graphs with translation/shift laws 5. Explains the occurrence of new functions based on the operation of functions and function composition	**Criteria:** Full marks are obtained if you do all the questions correctly	Problem-based learning and discussion 6 X 50			0%
6							0%
7	Able to explain the definition of limits, derivatives and properties of derivatives and be able to find derivatives of various functions	1. Explain the definition of a derivative and the properties of a derivative 2. Explain derivatives with chain rules, higher order derivatives, implicit function derivatives and parameter function derivatives	**Criteria:** Full marks are obtained if you do all the questions correctly	Problem-based learning and discussion 3 X 50			0%

8	Able to apply derivatives of a function in the field of transportation engineering	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:** Full marks are obtained if you do all the questions correctly	Problem-based learning and discussion 3 X 50			0%
9	Midterm exam		**Criteria:** Full marks are obtained if you do all the questions correctly	3 X 50			0%
10	Solving 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:** Full marks are obtained if you do all the questions correctly	6 X 50			0%
11							0%
12	Able to apply Definite Integrals to calculate Plain Area, arc length associated with the transportation field	Calculating Plain Area and arc length	**Criteria:** Full marks are obtained if you do all the questions correctly	Problem-based learning and 1 X 1 discussions			0%
13	Able to understand the definition of a matrix, types of matrices, operations on matrices, matrix determinants and matrix inverses Able to solve systems of linear equations (SPL) using matrices	1. Obtaining the determinant and inverse of a matrix, completing various operations in matrices 2. Solving Systems of Linear Equations	**Criteria:** Full marks are obtained if you do all the questions correctly	Problem-based learning and discussion 6 X 50			0%
14							0%
15	Able to solve daily life problems using SPL on matrices.	Get information on solving daily problems in the field of Transportation Engineering	**Criteria:** Full marks are obtained if you do all the questions correctly	Problem-based learning and discussion 3 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.