



**INSTITUT TEKNOLOGI SEPULUH NOPEMBER  
FACULTY OF SCIENCE AND DATA ANALYTICS  
DEPARTMENT OF STATISTICS  
STATISTICS UNDERGRADUATE PROGRAM**

Course	Course Name	:	<b>Calculus I</b>
	Course Code	:	SM234101
	Credit	:	3 SKS
	Semester	:	I

**COURSE DESCRIPTION**

In this course, the students will learn the matrix concept, determinant, and system of linear equations, the concept of mathematical thinking in solving the artificial problems, modeling, etc in the technique that related to the differential application. The materials in this course are emphasized on the problem solving of real cases that can be formulated in the one dependent variable function. The materials include: matrix and determinant, system of linear equations, real number system (ordered, absolute value), complex number and algebraic operations, functions and limits in the polar form of the complex number, derivatives including its applications, and indefinite integrals.

**PROGRAM LEARNING OUTCOME**

- PLO-1 Students are able to identify and explain foundations of mathematics that include pure, applied, and the basic of computing
- PLO-2 Students are able to solve simple and practical problems by applying basic mathematical statements, methods and computations

**COURSE LEARNING OUTCOME**

- CLO.1 Students are able to apply equalities or inequalities as well as graphs of Linear Equation functions.
- CLO.2 Students are able to apply complex variable forms in polar form and get the roots of the equation.
- CLO.3 Students are able to apply matrix concepts to solve a linear equation system and determine the eigen value.
- CLO.4 Students are able to determine the continuity of functions and their derivatives.
- CLO.5 Students are able to apply integrals through the fundamental theorem of calculus.

**MAIN SUBJECT**

1. Basic concept of real number system: definition of real number system, decimal form of real number, coordinate system, nature of sequence, definition of absolute value, graph of linear equations.
2. The basic concept of complex numbers: addition, multiplication, quotient, polar form of complex numbers and their algebraic operations and the drawing of equations in complex number systems.
3. The basic concept of matrix algebra, determinant properties, elementary line operations, systems of linear equations and the problem of eigenvalues or eigenvectors.
4. The concepts of function, limit: domain, range, linear, quadratic and trigonometric or

transcendent function, function graph, limit function and continuity.

5. Differential / derivative: definition of derivatives, referenced rules (for polynomial, trigonometric, transendent functions), chain rules and implicit derivatives of functions.
6. Derivative Applications: corresponding rates, increment interval, slope, graph sketch having asymptotes and peaks, extrema values and application of optimization problems.
7. Indefinite integral: Derivative and anti-derivative, Fundamental Theorems of Calculus.

**PREREQUISITE**

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**REFERENCES**

1. Tim Dosen Jurusan Matematika ITS, Diktat Matematika 1 , Edisi ke-5 Jurusan Matematika ITS, 2020
2. Anton, H. dkk, Calculus, 10-th edition, John Wiley & Sons, New York, 2012
3. Kreyzig, E, Advanced Engineering Mathematics, 10-th edition, John Wiley & Sons, Singapore, 2011
4. Purcell, J, E, Rigdon, S., E., Calculus, 9-th edition, Prentice-Hall, New Jersey, 2006
5. James Stewart , Calculus, ed.7, Brooks/cole-Cengage Learning, Canada,2012