INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS
DEPARTEMEN TEKNIK ELEKTRO
Program Studi Sarjana (S1) Teknik Telekomunikasi

1	**Nama Mata Kuliah / Course Name**	:	Kalkulus 1 / Calculus 1
2	**Kode Mata Kuliah / Course Code**	:	SM234101
3	**Kredit / Credits**	:	3 SKS
4	**Semester / Semester**	:	1

Deskripsi Mata Kuliah / *Course Description*

Dalam Mata Kuliah ini mahasiswa akan mempelajari pokok bahasan pokok bahasan sebagai berikut:

1. Konsep dasar sistem bilangan real: pengertian sistem bilangan real, bentuk desimal bilangan real, sistem koordinat , sifat urutan, pengertian nilai mutlak, garis – grafik persamaan linear.
2. Konsep dasar bilangan kompleks: penjumlahan, perkalian, hasil bagi, bentuk polar bilangan kompeks beserta operasi aljabarnya dan penarikan akar persamaan dalam sistem bilangan kompleks.
3. Konsep dasar aljabar matrik, sifat-sifat determinan, operasi baris elementer, sistem persamaan linier dan masalah nilai eigen atau vector eigen.
4. Konsep-konsep fungsi, limit: domain, range, fungsi linier, kuadratik dan trigonometri atau transcendent, grafik fungsi, limit fungsi dan kontinuitas.
5. Diferensial/turunan: definisi turunan, aturan-aturan diferensisasi (untuk fungsi polynomial, trigonometri, tramsendent), aturan rantai dan turunan fungsi implisit.
6. Aplikasi Turunan: laju-laju berkaitan, interval naik-turun, kecekungan, sketsa grafik yang mempunyai asimtot dan puncak, nilai ekstrema dan aplikasi masalah optimasi.
7. Integral tak-tentu: turunan dan anti turunan , Theorema Fundamental Kalkulus.

In this course students will study the following subject matter:

1. *The basic concept of the real number system: the definition of the real number system, the decimal form of the real number, the coordinate system, sequence properties, the definition of absolute value, the lines – graphs of linear equations.*
2. *Basic concepts of complex numbers: addition, multiplication, quotient, polar forms of complex numbers along with their algebraic operations and drawing roots of equations in the complex number system.*
3. *Basic concepts of matrix algebra, determinant properties, elementary row operations, systems of linear equations and eigenvalue or eigenvector problems.*

4. *Function concepts, limits: domain, range, linear, quadratic and trigonometry or transcendent functions, function graphs, function limits and continuity.*
5. *Differential/derivative: definitions of derivatives, differentiation rules (for polynomial, trigonometry, tramsendent functions), chain rules and implicit function derivatives.*
6. *Application of Derivatives: related rates, rise and fall intervals, concavity, graphic sketches that have asymptotes and peaks, extreme values and application of optimization problems.*
7. *Indefinite integral: derivative and anti-derivative , Fundamental Theorem of Calculus.*

Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah / *Program Learning Outcomes Charged to The Course*

1. (CPL-04) Mampu menerapkan ilmu pengetahuan alam dan matematika serta teknologi dan rekayasa informasi untuk memperoleh pemahaman komprehensif pada bidang Teknik Telekomunikasi.
   (PLO-04) Able to apply natural sciences and mathematics as well as information technology and engineering to gain a comprehensive understanding in the field of Telecommunication Engineering.

2. (CPL-08) Mampu mengetahui dan mengaplikasi metode dan keahlian sesuai perkembangan terkini di bidang ilmu pengetahuan dan teknologi untuk menyelesaikan permasalahan di bidang Teknik Telekomunikasi dengan mengedepankan nilai-nilai universal
   (PLO-8) Able to know and apply methods and expertise according to the latest developments in the field of science and technology to solve problems in the field of Telecommunication Engineering by prioritizing universal values

Capaian Pembelajaran Mata Kuliah / *Course Learning Outcomes*

1. Mahasiswa mampu menerapkan persamaan atau pertidaksamaan serta grafik fungsi Persamaan Linear / *Students are able to apply equations or inequalities as well as graphs of Linear Equation functions*
2. Mahasiswa mampu mengaplikasikan bentuk peubah kompleks dalam bentuk polar serta menarik akar-akar persamaannya / *Students are able to apply complex variable forms in polar form and draw the roots of the equation*
3. Mahasiswa mampu menerapkan konsep matriks untuk menyelesaikan sistem persamaan linier dan menentukan nilai eigen / *Students are able to apply the matrix concept to solve systems of linear equations and determine eigenvalues*
4. Mahasiswa mampu menentukan kekontinuan fungsi dan turunanannya / *Students are able to determine the continuity of functions and their derivatives.*
5. Mahasiswa mampu menerapkan integral melalui teorema fundamental kalkulus / *Students are able to apply integrals through the fundamental theorem of calculus.*

Pokok Bahasan / *Contents*

1. Matrik dan Determinan / *Matrix and Determinants*
2. Persamaan, pertidaksamaan, grafik fungsi parabola, lingkaran atau elips / *Equations, inequalities, graphs of functions of parabolas, circles or ellipses*

3. Bilangan kompleks dan bentuk polarnya */ Complex numbers and their polar forms*
4. Kekontinuan fungsi dan turunanyaIntegral dan Theorema Fundamental Kalkulus / *Continuity of functions and their integral derivatives and the Fundamental Theorem of Calculus*

Prasyarat/ Pre-requisite

Pustaka/ Reference

Utama / Primary :

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

Pendukung / Support:

1. Kreyzig, E, *Advanced Engineering Mathematics*, 10-th edition, John Wiley & Sons, Singapore, 2011
2. Purcell, J, E, Rigdon, S., E., *Calculus,* 9-th edition, Prentice-Hall, New Jersey, 2006
3. James Stewart , *Calculus*, ed.7, Brooks/cole-Cengage Learning, Canada,2012