

ADDIS ABABA UNIVERSITY
DEPARTMENT OF MATHEMATICS
MATH 2041: APPLIED MATHEMATICS II (Pre Engineering students)
COURSE OUTLINE Academic year 2021/2022

Chapter 1: Sequence and Series

- 1.1 Definition of sequence
- 1.2 Convergence and divergence of a sequence, types of sequences
- 1.3 Subsequence and limit points
- 1.4 Definition of infinite series
- 1.5 Convergence and divergence of a series, properties of convergent series
- 1.6 Nonnegative terms and series
- 1.7 Tests of convergence: Integral test, Comparison test, Ratio and Root tests
- 1.8 Alternating series and alternating series test
- 1.9 Absolute and conditional convergence
- 1.10 Generalized convergence tests

Chapter 2: Power Series

- 2.1 Definition of power series at any x_0 and $x_0=0$
- 2.2 Convergence and divergence of power series, radius and interval of convergence
- 2.3 Algebraic operations in convergent power series
- 2.4 Differentiation and integration of power series
- 2.5 Taylor and MacLaurian series
- 2.6 Binomial series

Chapter 3: Fourier Series

- 3.1 Periodic Functions
- 3.2 Trigonometric series
- 3.3 Fourier series representation; Dirichlet's Theorem
- 3.4 Fourier series of even and odd functions
- 3.5 Half-range expansion

Chapter 4: Differential Calculus of function of several variables

- 4.1 Definition of function of several (two or more) variables, examples, level curves and graphs of function of two variables, level surfaces
- 4.2 Limit and continuity
- 4.3 Partial derivatives, higher order partial derivatives
- 4.4 Directional derivatives and gradients
- 4.5 Total differentials, tangent planes and tangent plane approximation
- 4.6 The chain rule, implicit differentiation

- 4.7 Relative extrema of functions of two variables
- 4.8 Extreme values of a function on a given set
- 4.9 Extreme under constraints, Lagrange multipliers

Chapter 5: Multiple integral

- 5.1 Double integral and their evaluation by iterated integrals
- 5.2 Double integral in polar coordinates
- 5.3 Application: Area, Surface area, center of mass of plane region
- 5.4 Triple integrals and their evaluation by iterated integrals
- 5.5 Triple integrals in cylindrical and spherical coordinates
- 5.6 Application: Volume, center of mass of solid region
- 5.7 Change of variables in multiple integrals

Assessment methods of the course

Assignments (at least two)=20%;

Mid Exam =20%

Quizzes/tests=10%

Final Examination =50%

Text Books of the module:

1. Robert Ellis and Denny Gulick, *Calculus with analytic geometry*, 6th ed, Harcourt Brace Jovanovich, Publishers, 5th ed, 1993.
2. Demissu Gameda: *An Introduction to Linear Algebra*, 2000, Department of Mathematics, AAU.
3. Serge Lang: *Linear Algebra*, 1974, Springer Science + Business Media Inc.

References:

1. Johnson and Kiokemister: *Calculus with Analytic Geometry*
2. Howard Anton: *Calculus with Analytic Geometry*, 2000, Anton Text Books, Inc.
3. James Stewart: *Calculus*, 2009, Thomson Brooks/Cole.
4. H. Anton and C Rorres, *Elementary linear algebra*, 1994, John Wiley & Sons, Inc.
5. Erwin Kreyszing: *Advanced Engineering Mathematics*.