

ADDIS ABABA SCIENCE & TECHNOLOGY UNIVERSITY
DEPARTMENT OF MATHEMATICS
APPLIED MATHEMATICS III COURSE OUTLINE
ACADEMIC YEAR: 2020/21 SEMESTER: II

Course Title: Applied Mathematics III B

Course Code: Math2042

Credit Hours: 4

Contact Hrs: 3

Tutorial Hrs: 3

Prerequisite: Math 2007

Course Category: Compulsory

Instructor's Name _____

Course Contents:

Chapter 1: Ordinary Differential Equation of the First Order

- 1.1. Basic Concepts and Ideas
- 1.2. Separable Equations
- 1.3. Equations Reducible to Separable Form
- 1.4. Exact Differential Equation
- 1.5. Integrating Factors
- 1.6. Linear First Order Differential Equations

Chapter 2: Ordinary Differential Equation of the Second Order

- 2.1. Homogeneous Equations with Constant Coefficients
 - 2.1.1. General Solutions, Basis, Initial Value Problem
 - 2.1.2. Real Root, Complex Roots, Double Root of the Characteristic Equation
- 2.2. Non-Homogeneous Equations with Constant Coefficients
 - 2.2.1. The Method of Undetermined Coefficients
 - 2.2.2. Variation Parameters
 - 2.2.3. System of Ordinary Differential Equation of the First Order
- 2.3. (Reading Assignment) Linear ODE Of Higher Order; System Of ODE Of Higher Order

Chapter 3: Laplace & Fourier Transformations

- 3.1. Laplace Transform
- 3.2. Differentiation of Laplace Transform
- 3.3. Integration of Laplace Transform
- 3.4. Convolution & Integral Equation
- 3.5. Fourier Transform

Chapter 4: Vector Differential Calculus

- 4.1. Vector Calculus (Limit, Derivative & Integral of Vector Valued Functions)
- 4.2. Curves & Their Lengths
- 4.3. Tangent, Curvature & Torsion
- 4.4. Scalar Fields & Vector Fields
- 4.5. Gradients of Scalar Fields
- 4.6. Divergence & Curl of Vector Field

Chapter 5: Line and Surface Integral

- 5.1. Line Integral
- 5.2. The Fundamental Theorem of Line Integrals & Independent of Path
- 5.3. Green's Theorem
- 5.4. Surface Integral
- 5.5. Divergence's Theorem & Stoke's Theorem

Chapter 6: Complex Analytic Functions

- 6.1. Complex Numbers; Complex Plane
- 6.2. Functions of Complex Variables: Limits, Derivatives & Analytic Functions
- 6.3. Cauchy – Riemann Equations; Laplace Equation
- 6.4. Elementary Functions: Exponential, Trigonometric, Hyperbolic, and Logarithmic Functions; Power Functions
- 6.5. Complex Integral

Teaching- learning methods

Three contact hours of lectures and three hours of tutorials per week. Students do home assignment.

Assessment Methods

Tests & Quizzes	30%
Assignments	20%
Final Examination	50%

Teaching Materials

Textbook: - Erwin Kreyszig, Advanced Engineering Mathematics

References:

- J. Stewart , Calculus
- R. Ellis, Calculus With Analytic Geometry
- R.V. Churchill, Complex Variables & Application