Dire Dawa University
Department of Mathematics
Course Outline

Course Information	
Program	**Regular**
Module Name	**Advanced Engineering Mathematics**
Course Title	**Applied Mathematics III**
Course Code	**Math1042**
ECTS	**7**
Students workload	**Cr. Hr 4 (Lecture Hrs 4, Tutorial Hrs 3)**
Academic year	**2017 E.C**
Semester	**II**
Target group	2nd year Chemical, Electrical and Mechanical Engineering Students
Course Description	
This course covers first and second-order differential equations, the Fourier series and its transformations, Vector calculus with some applications, and complex analysis	
Learning Outcomes:	
At the end of this course, students will be able to: • Solve linear differential equations of first and second order and apply to physical phenomena. • Derive the Laplace transform and apply it to solve ordinary differential equations. • Find the Fourier series of periodic functions. • Evaluate line and surface integral of functions. • Compare the limit and derivative of complex variables with real variables.	

Chapter 1: Ordinary Differential Equations

1.1 Basic concepts of ODE
1.2 Separable Differential Equations
1.3 Homogeneous Differential Equations
1.4 Exact Differential Equations
1.5 First-order Differential Equations
1.6 Second order linear differential equations

Chapter 2: Laplace Transform

2.1 Definition
2.2 Linearity & Inverse of Laplace transform
2.3 Existence of Laplace transform
2.4 First order shift(s-shifting)
2.5 Laplace transforms of derivative & Integrals
2.6 Second order shift(t-shifting)
2.7 Differentiation & Integration of transforms

2.8 Convolution

2.9 Systems of Differential Equations

Chapter 3: Fourier Series and Integrals

3.1 Periodic functions

3.2 Fourier Series

3.3 Fourier Cosine and Sine Series

3.4 Complex Fourier Series

3.5 Fourier Integral

3.6 Fourier Cosine and Sine Integral

3.7 Fourier Transform

Chapter 4: Vector Calculus

4.1 Revision of vector-valued function.

4.2 Revision on vector differential calculus

- Gradient of scalar field
- Divergence and Curl of a vector field

4.3 Line Integral

4.4 Existence and Independence of Path

4.5 Green's Theorem

4.6 Surface Integral

4.7 Gauss divergence theorem

Chapter 5: Complex Analysis

5.1 Complex numbers and plane

5.2 Functions of complex variables

5.3 Limit and continuity of analytic functions

5.4 Cauchy-Riemann and Laplace equation

5.4 Complex Integration

Assessment plan: Quiz 1 (5%), Mid-exam (30%), Quiz 2 (5%), Assignment (10%), Final examination (50%).

Text & Reference Books:

1. Erwin Kreyszing(2005). Advanced Engineering Mathematics. 9thedition.Wiley.(Text)
2. R.Ellis and D.Gulick(1998).Calculus with Analytic Geometry, 5thedition.Harcourt.
3. Stewart, J. (2002), Calculus, 5th edition, Brooks Cole.
4. Churchile, R.V. (2003). Complex variable and application.