

Far Western University
Faculty of Engineering
Bachelor's Degree in Architecture
Course of Study 2075

Course Title: Engineering Mathematics II	Credit: 3
Course Code.: SH 122	Number of lecture/week: 3
Nature of the Course: Theory	Practical/week:1
Year/Semester: I/II	Total hours: 45

1. Course Description:

The course aims to acquaint the students with the basic concept and applications of differential equations, multiple integrals, two and three dimensional geometry and Matrix theory in engineering fields.

2. Course Objectives:

- (i) To enable the students, to understand the differential equations and its applications.
- (ii) To acquaint the students with the basic concept of multiple integral and two and three dimensional geometry.
- (iii) To know the applications of matrix theory in engineering fields.

3. Specific objectives and contents:

Specific Objectives	Units/Chapters
- To know the definitions of matrix and its types. - To understand the definitions of determinant and their properties. - To get the clear concept of vector space and correlate with matrix space. - To study the linear transformations and theory related to it. - To solve system of linear equations and its applications. - Study the definition of rank and its relation with matrix theory. - Define the term eigen values and eigen vectors and applications.	Unit 1: Matrix and Determinant (9 Hrs) 1.1 Matrix and Determinants 1.2 Vector Spaces 1.3 Linear Transformations 1.4 System of Linear Equations, Gauss Elimination 1.5 Rank, Matrix 1.6 Eigen values and Eigen vectors

• Study the meaning of Direction cosines and direction ratios. • To study the theory related to straight lines • To obtain the equation of spheres and tangent planes and theory related to it • To define the cone and cylinder and their standard equations • To study the plane curves • To obtain the parametric equation • To study the polar coordinates • To study the integrals in polar coordinates • Define the multiple integrals and its basics • To obtain the area and volume using multiple integral • To obtain the center using the concept of multiple integrals • Study of order and degree of differential equation with examples • Study the different type of differential equation and their solutions • To study the homogeneous and non homogeneous differential equation with their solutions • To study the initial value problems • To study the power series and its solution • To study the Legendre's and Bessel's equation and their solutions • To study their properties and applications	Unit 2: Three Dimensional Geometry (12 Hrs) 2.1 Review of Direction Cosines, Direction Ratios, planes. 2.2 Straight Lines 2.3 Sphere and its Tangent Planes 2.4 Cone and Cylinder (definitions, standard equation only) Unit3: Plane Curves and Polar Coordinates (5 Hrs) 3.1 Plane Curves 3.2 Parametric Equation 3.3 Polar Coordinates 3.4 Integrals in Polar Coordinates Unit 4:Multiple Integrals (5 Hrs) 5.1 Multiple Integrals 5.2 Area and Volume 5.3 Centroids Unit 5: Differential Equation (14 Hrs) 5.1 Order and degree of Differential Equation 5.2 First order differential equation with their solutions (reducible to separable form, homogeneous form, exactness condition) linear and Bernoulie's equation. 5.3 Second order differential equation (Homogeneous and non homogeneous) with constant coefficient as well as variable coefficient. 5.4 Initial value problems 5.5 Power series Solution 5.6 Legendre's and Bessel's equation with their solution, properties and application
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Reference Books

1. E.W. Swokowski, "Calculus with Analytic geometry " , Second Alternate edition, PWS-Kent Publishing Co., Boston.
2. E.Kreszig , "Advanced Engineering Mathematics" , Fifth Edition, Wiley, New York.