

Faculty of Engineering & Technology

Differentiation with Applications and Algebra (Math 1)

Information :

Course Code : MTH 111

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Faculty of Engineering & Technology

Instructor Information :

Title	Name	Office hours
Professor	Emil Sobhy Saad Shokrallah	13
Lecturer	Nasser Abdulfadeel Abdulhameed Saeed	4
Teaching Assistant	Doaa Nabil Sayed Mohamed Elsayed Khodair	4
Teaching Assistant	Basma Magdy Ahmed Mohamed	4
Teaching Assistant	Dina Mohamed Elsayed Tantawy	
Teaching Assistant	Nada Hemid Mousa Hemid	

Area Of Study :

- Demonstrate a sound understanding of the concepts of differential calculus and linear algebra.
 - Develop mathematical skills for the rules of differentiation to the solution of engineering problems.
- Algebra: Definitions and properties of determinant and matrices; System of Linear equations, Eigen values and Eigenvectors of a matrix with applications, Gauss elimination method. Theory of nonlinear equations Numerical methods: Iteration methods, Newton's and modified Newton's method, Secant method.

Description :

Concepts of a function, limits, continuity, and differentiation. Rules of Differentiation. Differentiation of algebraic and transcendental functions and their Inverses. Application of derivatives. Taylor and Maclaurin expansion. Extrema of a function. Asymptote lines, Curve Sketching. Higher derivatives and Leibnitz Rule. Indeterminate forms and L'Hopital's rule. Algebra of determinants and matrices, Solution of linear systems. Gauss - Jordan Method, Iterative Methods. Eigenvalues and Eigenvectors.

Course outcomes :

a.Knowledge and Understanding: :

1 -	Explain the concepts of function, limit, properties of functions, continuity, inverse of algebraic functions, rules of differentiation, differentiation of algebraic and transcendental functions with inverses, and curve sketching.
2 -	Explain the higher derivatives of functions, Leibnitz rule, curve sketching, and Taylor and Maclaurien series & polynomials with absolute error estimation.
3 -	Identify various forms of indeterminate quantities, and L'Hopital rule application for certain types of Indeterminate forms.
4 -	Recognize determinants, matrix algebra, and direct and iterative methods for the solution of algebraic linear systems.

5 -	Illustrate the eigenvalues and the corresponding eigenvectors of a matrix.
b. Intellectual Skills :	
1 -	Analyze the theorems, concepts, methods, and rules of differentiation for algebraic and transcendental functions.
2 -	Apply Taylor theorem for the approximation of functions, and L'Hopital rule for Indeterminate quantities evaluations.
3 -	Apply matrix algebra, inverse matrix, reduced matrix, to the solution of linear system of algebraic equations.
4 -	Solve linear system of equations (homogeneous and non-homogeneous) by using Gauss - Jordan method, and other direct methods, or by any convenient iterative methods.
5 -	Apply matrix algebra in finding eigenvalues and eigenvectors.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Concept of a function, limits, properties, Continuity, & Differentiation.	5	3	2
Rules of Differentiation. Chain rule, Implicit Differentiation. Differentiation of parametric functions.	5	3	2
Transcendental functions and differentiation. Trigonometric and Inverse Trigonometric Functions. Exponential and Logarithmic Functions. Hyperbolic and Inverse Hyperbolic functions.	5	3	2
Application of derivatives. Taylor and Maclaurin expansion, polynomial, and series. Extrema of a function. Asymptote lines. Curve Sketching.	10	6	4
Higher derivatives and Leibnitz rule. Indeterminate Forms and L'Hopital's Rule.	10	6	4
Definitions and properties of determinants and matrices, Algebra of Matrices. Inverse Matrix.	5	3	5
Reduced matrix. Rank of a Matrix. Solution of linear systems using inverse Matrix, and Cramer's Rule	10	6	4
Gauss - Jordan Method. Homogeneous and non-homogeneous systems. Square and rectangular systems	5	3	5
Solution of linear algebraic systems by Iterative Methods. Jacobi method, Seidel Method.	5	3	2
Eigenvalues and Eigenvectors of a matrix.	10	6	4

Teaching And Learning Methodologies :

Interactive Lecturing
Discussion
Problem Solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	10.00		
Final exam	40.00		

First Exam	20.00		
Performance	10.00		
Second Exam	20.00		

Books :

Book	Author	Publisher
No Book	no	no

Course Notes :

Handouts on the Moodle

Recommended books :

- Earl W. Swokowski, "Calculus with Analytic Geometry, Prindle, Weber & Schmidt.
- Peter V. O'Neil, "Advanced Engineering Mathematics".
- Larson, R, Edwards, B & Falvo, D 2004, Elementary linear algebra, 5th edn, Houghton Muffling, Boston, Massachusetts.

Periodicals :

www.sosmath.com, www.math.hmc.edu,
www.tutorial.math.lamar.edu,
www.web.mit.edu

Web Sites :

www.sosmath.com, www.math.hmc.edu,
www.tutorial.math.lamar.edu,
www.web.mit.edu