FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

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
Lecturer	Soliman Abdulkarim Alkhatib	7
Assistant Lecturer	Doaa Nabil Sayed Mohamed Elsayed Khodair	10
Assistant Lecturer	Basma Magdy Ahmed Mohamed	12
Teaching Assistant	Ahmed Elsayed Abdellatif Ibrahim Bedeir	
Teaching Assistant	Mariam Mohamed Kamal Abdelaziz	

Area Of Study :

To familiarize students with the basic concepts of Differentiation with Applications and Algebra and to make them able to develop an understanding of mathematical concepts that provide a foundation for the mathematics encountered in Engineering. The course allows students to work at their own level thereby developing confidence in mathematics and general problem solving. On successful completion of this course the student will be able to:
1. demonstrate a sound understanding of a number of mathematical topics that are essential for studies in Engineering;
2. interpret and solve a range of problems involving mathematical concepts relevant to MTH 111;
3. Effectively communicate the mathematical concepts and arguments contained in this course.

Description :

1) Calculus:
A) Concept of a function, limits, Continuity, and Differentiation.
B) Rules of Differentiation. Chain rule, Implicit Differentiation. Differentiation of parametric functions.
C) Transcendental functions and differentiation. Trigonometric and Inverse Trigonometric Functions. Exponential and Logarithmic Functions.. Hyperbolic and inverse hyperbolic functions.
D) Indeterminate Forms and L'Hopital's Rule.
E) Application of derivatives. Taylor and Maclaurin expansion, polynomial, and series. Extrema of a function. Asymptote lines, Curve Sketching.
2) Algebra:
A) Definitions and properties of determinants and matrices, Algebra of Matrices.
B) Reduced matrix. Rank of a Matrix. Solution of linear systems using inverse Matrix, and Cramer's Rule.
C) Gauss - Jordan Method. Homogeneous and non homogeneous systems. Square and rectangular systems.
D) Solution of linear algebraic systems by Iterative Methods. Jacobi method, Seidel Method.
E) Eigenvalues and Eigenvectors.

Course outcomes :

a.Knowledge and Understanding: :

1 -	Provide a through understanding and working knowledge of mathematics relevant to this course.

2 -	Develop techniques for solving problems that may arise in everyday life.
b.Intellectual Skills: :	
1 -	Demonstrate knowledge of the theory, concepts, methods, and techniques of Mathematical analysis, and Linear algebra
2 -	Think logically.
3 -	evaluate the evolving state of knowledge in a rapidly developing area
4 -	Transfer appropriate knowledge and methods from one topic within the subject to another.
c.Professional and Practical Skills: :	
1 -	Understand Limits of functions and be able to compute them where they exist by analytical methods.
2 -	Understand the analytical and geometrical concepts of continuous functions, and be able to determine points of discontinuity of functions.
3 -	Understand derivatives as rates of change, and be able to calculate derivatives of algebraic and trigonometric functions.
4 -	Know the relationship between the derivative of a function and the tangent line to the function at a given point, ad be able to compute the derivatives of representative functions by judicious use of the power rule, product rule, quotient rule and chain rule.
5 -	Understand the first and second derivative test and be able to compute the local and absolute extrema, and inflection points of representative functions.
6 -	Form connections between a function to its graph using information about its derivatives, extrema, concavity, asymptotes lines, and inflection points.
d.General and Transferable Skills: :	
1 -	Gain the principle of quality control.
2 -	Develop skills related to creative thinking, problem solving.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Concept of a function, limits, Continuity, and 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
First Exam			
Indeterminate Forms and L 'Hopital's Rule	5	3	2
Definitions and properties of determinants and matrices, Algebra of Matrices. Inverse Matrix.	5	3	2
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	2
second Exam			
Solution of linear algebraic systems by Iterative Methods. Jacobi method, Seidel Method.	5	3	2

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Eigenvalues and Eigenvectors of a matrix.	5	3	2
Final Exam			

Teaching And Learning Methodologies :

- Lectures
- Tutorial
- Class discussions and activities
- Homework and self-study

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments and quizzes	20.00	1	
Attendance and Participation	10.00	1	
Final-term Exam	40.00	15	To assess overall understandings, concepts, Knowledge, Problem solving, and mathematical skills delivered by the course,
First Exam	15.00	6	To assess the levels of math skills needed for successful completion of the course, and to improve teaching and learning for all students.
Second Exam	15.00	12	To assess comprehension, Knowledge, Problem solving, and mathematical skills delivered by the course after 5 weeks of studying.

Course Notes :

Course notes
Handouts

Recommended books :

(1) Larson, R, Edwards, B & Falvo, D 2004, Elementary linear algebra, 5th edn, Houghton Mufflin, Boston, Massachusetts.
(2) Stewart, J 2005, Calculus: concepts & contexts, 3rd edn, Thomson/Brooks/Cole, Australia.

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