Faculty of Engineering & Technology

Functions of Several Variables and ODE (Math 3)

Information :

Course Code : MTH 211	**Level** : Undergraduate	**Course Hours :** 3.00- Hours

Department : Department of Mechanical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Hany Abd El Ghaffar Abd El Aty El Deeb	2
Assistant Lecturer	Basma Magdy Ahmed Mohamed	6
Assistant Lecturer	MOAMEN AHMED GASSER HASSAN KAMEL IBRAHIM KAMEL	
Assistant Lecturer	TAREK ALI ABDALLAH TEAMA	
Teaching Assistant	Bassel Yasser Mohamed Kamel	1
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Area Of Study :

On successful completion of this course the student will:

Develop the students' knowledge about several variables, multiple integrals, ordinary differential equations, and vector Analysis.
Train students to perform basic mathematical models on electrical engineering applications.

Description :

Functions of several variables: Limits, Continuity, partial derivatives, Extrema and Constrained Extrema. Multiple integrals in Cartesian and Polar coordinates. Jacobians, Vector analysis: Scalar and vector fields, Gradient, Divergence, Curl and Directional derivative. Line integral, Green's theorem, Gauss's theorems, and Stoke theorem. Ordinary differential equations of the first and higher orders. Complementary and Particular solutions. Undetermined coefficients, and variation of parameters. Euler's equations and system of linear differential equations. Differential Operator method

Course outcomes :

a.Knowledge and Understanding: :

1 -	Recognize vector and scalar quantities in calculus.
2 -	Explain partial derivative for the functions of several variables.
3 -	Define the line integral for both scalar and vector fields.
4 -	Identify different types of first and higher order ordinary differential equations.

b.Intellectual Skills: :

1 -	Apply theories of Vector analysis to solve Mechanical engineering problems.

http://www.fue.edu.eg

2 -	Solve the differential equations in Mechanical engineering problems.

c.Professional and Practical Skills: :

1 -	Solve the different types of line integral problems.
2 -	Apply the system of differential equations to solve Mechanical Engineering problems.

d.General and Transferable Skills: :

1 -	Communicate effectively.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Functions of several variables: Limits, Continuity, and partial derivatives, Chain rule. Tangent planes and normal lines, Extrema and Constrained Extrema,.	10	6	4
Multiple integrals: Double integral in Cartesian and Polar coordinates. Triple integrals, Surface integral of scalar functions. Jacobians, Cylindrical and spherical coordinates,	10	6	4
Vector analysis: Scalar and vector fields, Surface integrals of scalar and vector functions, gradient, divergence, curl, directional derivative, Line integrals.	10	6	4
Line integrals, Green's theorem, Gauss's theorem, Stoker's theorem and triple integrals in Cartesian and Polar coordinates.	10	6	4
Ordinary differential equations: Equations of the first order: Separable, Homogenous, nearly Homogenous, Exact, Linear, Bernoulli. Ricatti.	10	6	4
Higher order linear equations. Equations of the second order. Equations reducible to the first order. Complementary, and particular solutions.	10	6	4
Methods of Undetermined coefficients, and variation of parameters. Euler's equation	10	6	4
System of linear differential equations. Differential Operator method.	5	3	2

Teaching And Learning Methodologies :

Interactive Lecturing
Discussion
Problem-based Learning
Report

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignment	5.00		
Final Exam	40.00		

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Lab Computer	5.00		
Mid- Exam I	15.00		
Mid- Exam II	25.00		
Quizzes	10.00		

Course Notes :

Recommended books :

o Earl W. Swokowski, "Calculus with Analytic Geometry
Peter V. O'Neil, "Advanced Engineering Mathematics"
o Larson, R, Edwards, B & Falvo, D 2004, Elementary linear algebra, 5th edn,
Houghton Mufflin, Boston, Massachusetts.
o Stewart, J 2005, Calculus: concepts & contexts, 3rd edn, Thomson/Brooks/Cole,
Australia.

Web Sites :

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