FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

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 Structural Engineering & Construction Management

Instructor Information :

Title	Name	Office hours
Lecturer	Hany Abd El Ghaffar Abd El Aty El Deeb	
Lecturer	Abdallah Fathy Mohamed Badawy	
Assistant Lecturer	TAREK ALI ABDALLAH TEAMA	
Assistant Lecturer	TAREK ALI ABDALLAH TEAMA	

Area Of Study :

ÅEnrich studentsôknowledge about several variables, multiple integrals, ordinary differential equations, and vector Analysis.
ÅDevelop studentsôskills to apply differential equations on applications related to electrical engineering.

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 -	a1. Define the behavior of the function of several variables, multiple integrals, Vector analysis, and Ordinary differential equations.
2 -	a2. Recognize the Limits, Continuity, and partial derivatives, extrema and constrained extrema of functions of 2 variables, double and triple integrals in Cartesian and Polar coordinates.
3 -	a3. Illustrate the surface integral of scalar and vector fields, Divergence and Stock theorems, Jacobians, line integrals, cylindrical and spherical coordinates and its application,
4 -	a4. Describe Ordinary differential equations, distinguish between the degree and the order, and know various methods of the solution,
5 -	a5. Identify the general and particular solutions of O.D.E of the first order, second order, higher order.

b.Intellectual Skills: :

1 -	b1. Apply theories, techniques of Vector analysis, Ordinary differential equations to solve electrical engineering problems

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2 -	b2. Think creatively in solving problems related to electrical engineering.

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 integrals in Cartesian and Polar coordinates, 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 solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments and Quizzes	10.00		
Final-term Exam	40.00		
First Mid Exam	20.00		
Participation and performance	10.00		
Second Mid Exam	20.00		

Course Notes :

Course notes
Handouts

Recommended books :

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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.

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