FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Transformation and Numerical Analysis (Math 4)

Information :

Course Code :	MTH 212	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Department of Mechanical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Mohamed Reda Ali Mohamed	
Assistant Lecturer	Basma Magdy Ahmed Mohamed	2

Area Of Study :

Demonstrate a conscious understanding of the concepts of integral transforms, Laplace and Fourier transforms.
Develop studentsô mathematical skills for the methods of solution of initial and boundary values problems by using Laplace and Fourier Transforms, Fourier series, and Fourier integrals.
Acquire skills for the application of Numerical methods to the solution of Mechanical engineering problems.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	State Laplace Transform and its inverse for the one variable functions.
2 -	Define Fourier series and Transforms.
3 -	Explain different types of interpolation by numerical methods.
b.Intellectual Skills: :	
1 -	Solve Laplace Transforms of algebraic and transcendental functions.
2 -	Use Fourier series to Approximate functions.
3 -	Construct functions by using Least squares method.
4 -	Formulate interpolation by Lagrange polynomials.
c.Professional and Practical Skills: :	
1 -	Use the unit step function to calculate the system response.
2 -	Use Laplace Transforms to analyze mechanical engineering problems.
d.General and Transferable Skills: :	
1 -	Communicate effectively.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Laplace Transforms. Definition. Properties and theorems. Inverse Laplace transforms.	10	6	4
Calculating of Laplace transforms of algebraic and transcendental functions, Periodic functions, derivatives, unit-step functions, unit impulses, and Dirac delta functions.	10	6	4
Calculating of Inverse Laplace Transforms. Solution of Initial value problems	10	6	4
Integral equations by Laplace transform, Fourier series. Periodic and non-periodic Functions.	10	6	4
Series of odd and even functions. Half intervals Fourrier Series Convergence Theorem.	10	6	4
Fourier Integrals and Fourier Transforms. Definitions and properties of Fourier integrals and transforms. Finite Fourier transforms. Applications	10	6	4
Numerical solution of Initial Value problems. Euler, Modified Euler, and Runge Kutta methods. Applications.	10	6	4
Least Squares methods. Interpolation.	5	3	2

Teaching And Learning Methodologies :

- Interactive Lecturing
- Problem -based Learning
- Discussion
- Report

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	5.00		
Final Exam	40.00		
First Mid Exam	15.00		
lab Computer	5.00		
Quiz Exam	10.00		
Second Mid Exam	25.00		

Course Notes :

Handouts

Recommended books :

ÅWARREN S. WRIGHT, DENNIS G. ZILL, ñAdvanced Engineering Mathematics ñ¸ Jones &Bartlett Learning Publisher Fourth Edition, 2009.
ÅEARL W. SWOKOWSKI, ñCalculus with Analytic Geometryò¸ PWS Publishers, alternate Edition, 1983.