The Hashemite University
Faculty of Science
Course Description

Year 2021-2022	Semester : Summer

Course Information	
Course Title	Integral Equations
Course Number	110101405
Course Credits	3 Hours
Course Time	
Course Duration	One Semester
Prerequisite(s)	110101203
Instructor	
Office Location	
Office Hours	
Text Book	
Title	Linear Integral Equations
Author(s)	Ram P.Kanwal
Publisher	Birkhauser
Year	1996
Edition	Second edition.
References(s)	1. Integral Equations: A Short Course By Li. G. Chambers. 2. Integral Equations By J. Kondo.

Evaluation Policy		
Assessment Type	**Expected Date**	**Weight**
First Exam	**3rd week**	30 %
Second Exam	**5th week**	30 %
Final Exam	**7th week**	60 %

Course Objectives
1. Classification of the integral equations. 2. Converting the ordinary differential equations into integral equations. 3 Solving integral equations with separable kernels. 4. Solving integral equations by method of successive approximations. 5. Introducing the classical Fredholm Theory. 6. Solving integral equations with semmetric kernels. 7. Solving some singular integral equations. 8. Solving integral equations by hntegral transformation methods.

Teaching and Learning Methods
1. Introducing new definitions and using examples to illustrate new concepts. 2. Introducing theorems, and corollaries. 3. Proving the results that constitute the core of the course. 4. Giving examples and applications for some theorems and corollaries. 5. Giving a sample assignment for each section and Discussing some of them. 6. Making a discussion of the problems of each exam.

		Course Contents
Week	Section in text	Topics
1	1.1	Introduction
	1.2	Regularity Conditions
	1.3	Special Kinds of Kernels
	1.4	Egenvalues and Eigenfunctions
	1.5	Convolution Integral
	1.6	The Inner or Scalar Product of Two Functions
	1.7	Notation
2	5.1	Initial Value Problems
	5.2	Boundary Value Problems
	5.3	Examples
	5.4	Dirac Delta Function
	5.5	Green's Function Approach
	5.6	Examples
	5.7	Green's Function Approach for N-th O.D.E
	5.8	Modified Green's Function
3	2.1	Reducing to a System of Algebraic Equations
	2.2	Examples
	2.3	Freholm Alternatives
	2.4	Examples
	2.6	Freholm Integral Equation of the First Kind
4	3.1	Iterative Scheme
	3.2	Examples
	3.3	Volterra Integral Equation
	3.4	Examples
	3.5	Some Results about the Resolvent Kernel
5	4.1	The Method of Solution of Fredholm
	4.2	Freholm's First Theorem
	4.3	Examples
	4.4	Freholm's Second Theorem
	4.5	Freholm's Third Theorem
6	7.1	Introduction
	7.2	Fundamental Properties of Eigenvalues and Eigenfunctions for Symmetric Kernels
	7.3	Expantions in Eigenfunctions and Bilinear Form
	7.4	Hilbert Shmidt Theorem and Some Immediate Consequences
	7.5	Solution of Symmetric Integral Equations
	7.6	Examples
	7.8	The Operator Method in the Theory of Integral Equations
7	8.1	The Abel Integral Equation
	8.2	Examples
	9.3	Laplace Transform
	9.4	Applications to Volterra Integral Equations with Convolution-Type Kernels
	9.5	Examples