



Hankuk University of Foreign Studies

2020 Summer Session

MATH 200 Linear Algebra and Differential Equations

Course Outline

Term: July 06-August 07, 2020

Class Hours: 16:00-17:50 (Monday through Friday)

Course Code: MATH 200

Instructor: Dr. Hamidullah Farhat

Home Institution: Virginia Polytechnic Institute and State University

Office Hours: By Appointment

Email: hfarhat6@vt.edu

Credit: 4

Class Hours: This course will have 72 class hours, including 40 lecture hours, 10 lecturer office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

Course Description: Differential equations are used to model phenomena in, for example, basic sciences, engineering and economics. This course will cover basic techniques for solving differential equations. Main topics are integrating factors, undetermined coefficients, variation of parameter, Laplace transform. More than half of the course will be on systems of linear differential equations, whose study relies on linear algebra. After learning basic techniques in linear algebra, we will use them to solve systems of differential equations.

Course Objectives: The overall goals of this course are to present topics including solving first-order linear and nonlinear differential equations, second-order differential equations, and applications to physics and engineering. Basic concepts in linear algebra are introduced and applied to the solving linear and nonlinear systems of differential equations.



Required Textbook:

Differential Equations with Boundary Value Problems
by Polking, Boggess and Arnold
2nd Edition
Pearson

Grading & Evaluation:

10% Attendance 20% Homework 35% Midterm Exam 35% Final Exam

A+ : 95 – 100	A : 94 – 90
B+ : 89 – 85	B : 84 – 80
C+ : 79 – 75	C : 74 – 70
D+ : 69 – 65	D : 64 – 60
F : Fail	

Course Schedule:

Week 1	1	2.1, 2.2, 2.4	Separable Equations, Linear Equations
	2	2.5, 2.6	Mixing Problems, Exact Equations
	3	2.7, 2.8, 2.9	Existence, Uniqueness, Initial Conditions, Autonomous Equations
Week 2	4	4.1, 4.2	Second-Order Equations and Systems
	5	4.3, 4.4	Linear, Homogenous Equations, Harmonic Motion
	6	4.5, 4.6	Inhomogeneous Equations, Variation of Parameters
	7	5.1, 5.2, 5.3	Laplace Transform, Inverse Laplace Transform
Week 3	8	5.4, 5.6	Using the Laplace Transform, Delta Function
	9	7.1, 7.2	Vectors and Matrices, Systems of Linear Equations
	10	7.3	Solving Systems of Equations
	11		MIDTERM
Week 4	12	7.4, 7.5	Homogenous and Inhomogeneous Systems, Bases
	13	7.6, 7.7	Square Matrices and Determinants
	14	9.1, 9.2	Planar Systems
	15	9.3, 9.4	Phase Plane Portraits, The Trace-Determinant Plane
Week 5	16	9.5, 9.7	Higher Dimensional Systems, Qualitative Analysis of Linear Systems
	17	10.1	Linearization of nonlinear systems
	18	10.2	Long-term behavior of solutions