

AMATH 731 Fall 2019 Tentative Schedule

Lecture	Date	Lecture Notes	Contents
01	Sep 5	Lecture 1	Review Real Analysis
02	Sep 10	Lecture 2 Assignment 1 A1 Solutions	Review Linear Algebra Normed Linear Spaces: Definitions and Examples
03	Sep 12	Lecture 3	Cauchy Sequences and Banach Spaces
04	Sep 17	Lecture 4	Completeness of $(C[a, b], \ \cdot\ _\infty)$ and $(L_p[a, b], \ \cdot\ _p)$ (Riesz-Fischer Theorem)
05	Sep 19	Lecture 5	Open and Closed Sets; Convexity; Banach Fixed-Point Theorem and the Iteration Method.
06	Sep 24	Lecture 6	Applications of Banach Fixed Point Theorem to ODEs and Integral Equations
07	Sep 26	Lecture 7 Assignment 2 A2 Solutions	Continuity; Equivalent Norms; Compactness in Finite Dimensional Normed Spaces
08	Oct 1	Lecture 8	Compactness in Infinite Dimensional Normed Spaces; Compact Operators
09	Oct 3	Lecture 9	Schauder Fixed Point Theorem and Applications to ODEs
10	Oct 8	Lecture 10	Bounded Linear Operators
11	Oct 10	Lecture 11	Bounded Linear Operators (cont'd); Dual Spaces; $B(X, Y)$
	Oct 14-18		Thanksgiving + Reading Week
12	Oct 22	Lecture 12 Assignment 3 A3 Solutions	Infinite Series; Neumann Series; Fréchet Derivative
13	Oct 24	Midterm Solutions	Contents: Lectures 01 to 11 + Past Assignments
14	Oct 29	Lecture 13	Fréchet Derivative; Hahn-Banach Theorems
15	Oct 31	Lecture 14	Applications of Hahn-Banach Theorems; Inner Product Spaces
16	Nov 5	Lecture 15 & 16	Hilbert Spaces and Examples; Projection Theorem

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17	Nov 7	Lecture 15 & 16 Questions Assignment 4 A4 Solutions	Riesz Representation Theorem; Adjoint Operators Potential Questions for Final Exam
18	Nov 12	Lecture 17	Lax Milgram Theorem; Nonlinear Lax Milgram Theorem; Stampacchia Theorem
19	Nov 14	Lecture 18	Nonlinear Lax Milgram Theorem (cont'd); Generalized Fourier Series
20	Nov 19	Lecture 19	Orthonormal Basis; Spectral Theory
21	Nov 21	No Class	
22	Nov 26	Lecture 20 Sturm-Liouville Theorem Questions Assignment 5	Spectral Theory (cont'd) Sturm-Liouville Theorem Updated Potential Questions for Final Exam
23	Nov 28	Lecture 21	Sobolev Spaces (cont'd)
24	Dec 3	Lecture 22	Sobolev Spaces (cont'd)
		All Lectures	Combined All Lectures in One