

Math 535 Syllabus (151)

Dr. K. M. Furati

Course Title: Functional Analysis I**Textbook:** E. S. Suhubi, Functional Analysis, Springer, 2003**Course Description:** Normed linear spaces, Banach spaces, Hilbert spaces, Banach Algebras (definitions, examples, geometric properties), bounded linear operators, convex sets, linear functionals, duality, reflexive spaces, weak topology and weak convergence, Banach fixed point theorem, Hahn-Banach theorem, uniform boundedness principle, open mapping theorem, closed graph theorem, representation of functionals on Hilbert spaces (Riesz Representation Theorem).

Wk	Date	Sec.	Material	HW
1	Aug 23 - 25	2.2	Linear Vector Spaces	
		2.3	Subspaces	
		2.4	Linear Independence and Dependence	
2	Aug 30 - Sep 01	2.5	Basis and Dimension	
		2.7	Linear Transformation	
		2.10	Linear Functionals, Algebraic Dual	
3	Sep 06 - 08	5.2	The Metric and Metric Topology	
		5.3	Various Metric Spaces	
		5.4	Topological Properties of Metric Spaces	
4	Sep 13 - 15	5.5	Completeness of Metric Spaces	
		5.5	Contraction Mappings	
Id al-Adha Vacation				
5	Sep 29, T	5.7	Compact Metric Spaces: The Ascoli-Arzelà Theorem	
6	Oct 04 - 06	6.2	Normed Spaces	
		6.3	Semi-Norms	
		6.4	Series of Vectors	
7	Oct 11 -13	6.5	Bounded Linear Operators: Banach Algebra, Principle of Uniform boundedness, Open Mapping Theorem	
8	Oct 18 - 20			
9	Oct 25 - 27	6.6	Equivalent Normed Spaces	
		6.7	Bounded Below Operators	
10	Nov 01 - 03	6.8	Continuous Linear Functionals	
		6.9	Topological Dual	
11	Nov 08 - 10	6.10	Strong and Weak Topologies	
		6.13	Conjugate Operators	
		6.14	Classification of Continuous Linear Operators	
12	Nov 15 - 17	7.2	Inner Product Spaces	
13	Nov 22 - 24	7.3	Orthogonal Subspaces	
		7.4	Orthonormal Sets and Fourier Series	
14	Nov 29 - Dec 01	7.5	Duals of Higher Spaces	
		7.6	Linear Operators in Hilbert Spaces	
15	Dec 06 - 08	..	Review	