

**King Fahd University of Petroleum & Minerals**  
**Department of Mathematical Sciences**

(Sem. 052)

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<b>Course</b>	Math 531
<b>Title:</b>	Real Analysis
<b>Textbook</b>	Real Analysis by H. L. Royden, Third Edition
<b>References</b>	1) Introduction to Lebesgue Integration by Abdu-Rahim Khan 2) Introduction to Real Analysis by Munroe 3) Real and Complex Analysis by W. Rudin
<b>Objective</b>	This course is intended to give to the graduate students an exposure to the measure theory
<b>Material</b>	Chapters 1 - 6, and 11 from the textbook

**Office hours**

	8-8:50	9-9:50	10-10:50	11-11:50	12-12:50	1-1:50	4-4:50
Saturday							
Sunday							
Monday							
Tuesday							
Wednesday							

Week #	Topic	Home work
1	Review of real numbers, continuous functions, sequence of functions	
2	Elementary Set Theory : Open , Closed, Sigma algebra, Borel sets	
3 & 4	<b>Lebesgue Measure</b> : Outer measure, Measurable sets, Measurable functions, Almost everywhere notion, Egoroff's theorem	
5	<b>Riemann Integrals</b> : Darboux sums, Riemann Characterization theorem, integrable functions, defects of Riemann integration	
6 & 7	<b>The Lebesgue Integrals</b> : Integral of bounded functions, Bdd convergence theorem Integral of nonnegative function, Fatou's lemma, MCT General Lebesgue Integration, Dominated conv. Theorem.	
8	Convergence in measure, Relations between different types of convergence	
9 & 10	<b>Differentiation</b> : Monotone functions, Bounded Variation functions, Total variation Absolute continuity	
11 - 13	<b>The <math>L^p</math> Spaces</b> : Review of functional analysis, Definitions, Norms, Completeness, Minkowski's inequality, Holder's inequality, Approximation and density Bounded linear functionals, Riesz Representation theorem	
14 & 15	<b>The Abstract Measure and Integration</b> : Measurable spaces, measure spaces, Measurable functions, Integration, Signed measures, The Radon-Nikodym theorem	