

King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

Semester II, 2014-15 (142)
(Dr.Abdul Rahim Khan)

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| Course | Math 531 |
| Title | Real Analysis |
| Textbook | Real Analysis by H. L. Royden, Third Edition |
| References | 1) Introduction to Lebesgue Integration by Abdul Rahim Khan 2) Measure Theory and Integration by De Barra 3) Real and Complex Analysis by W. Rudin 4) An Introduction to Measure and Integration by I.K. Rana |
| Objective | This course provides an introduction and exposure to elementary measure theory. The main stress will be on the Lebesgue measure and integration and the classical L^p spaces. |
| Material | Chapters 1 - 6, 11 from the textbook |

| Week # | Topics |
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| 1 | Elementary set theory, Algebra of sets |
| 2 | The extended real numbers system, Continuous functions |
| 3 & 4 | Lebesgue Measure : Outer measure, Measurable sets, Measurable functions, Almost everywhere notion, Egoroff's theorem |
| 5 | Lebesgue Integral : Defects of Riemann integration, The Lebesgue Integral of a bounded function |
| 6 & 7 | Bounded convergence theorem, Integral of nonnegative function, Fatou's lemma, Monotone convergence theorem, General Lebesgue integration, Dominated convergence theorem |
| 8 | Convergence in measure, Relation among different types of convergence modes |
| 9 & 10 | Differentiation : Monotone functions, Bounded Variation functions, Total variation and Absolute continuity. |
| 11 - 13 | General Measure and Integration : Measurable spaces, Measurable functions, Integration, Signed measures, The Radon-Nikodym theorem |
| 14 & 15 | The L^p Spaces : Minkowski's inequality, Holder's inequality, Bounded linear functionals, Riesz representation theorem |

- KFUPM attendance policy will be applicable.
- **Evaluation Policy**: Exam I & II: 20% each; Homework/Assignments: 20%; Final exam (comprehensive): 40%.
- **Office: 5-505 [Phone # 2237] Email: arahim@kfupm.edu.sa**
- **Office Hours**: Sunday, Tuesday, Thursday [12.10 -2.00 P.M.]