

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS DEPARTMENT  
OF MATHEMATICS & STATISTICS**

**MATH 531: Real Analysis (212)**

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**Textbook:** Real Analysis by H.L. Royden and P.M. Fitzpatrick

**Learning outcomes:** The course is designed to introduce graduate students to measure theory. Stress will be particularly given to the Lebesgue measure, integration, and the classical  $L^p$ -spaces.

Assessment for this course is based on three homework's, two major exams and a comprehensive final exam, as described in the following table:

Activity	Weight
Homeworks	15%
<i>First Major Exam: (Chapters 2, 3 and 4)</i> <i>March 6, 2022</i>	25%
<i>Second Major Exam: (Chapters 5 and 6)</i> <i>April 21, 2022</i>	25%
<i>Final Exam: (Comprehensive)</i> As posted on the Registrar Website	35%

**Outcomes:** It is expected that the student shall be able to know and use the concept of Lebesgue measure on real line, general measure theory, convergence theorems, Lusin's theorem, Egorov's theorem, functions of bounded variation, absolutely continuous functions and Lebesgue differentiation theorem,  $L^p$ -spaces.

**Academic integrity:** All KFUPM policies regarding ethics apply to this course

For *Important Dates* and *Academic Calendar*, check the Registrar's site: <http://regweb.kfupm.edu.sa>

**The program**

- Chapter 2: Lebesgue Measure (sections 1-5) 3 weeks
- Chapter 3: Lebesgue Measurable Functions (sections 1-3) 2 weeks
- Chapter 4: Lebesgue Integration (sections 1-6) 2 weeks
- Chapter 5: Lebesgue Integration, Further Topics (sections 1-3) 1 week
- Chapter 6: Differentiation and Integration (sections 1-6) 2 weeks
- Chapter 7: The  $L^p$ -spaces: Completeness and Approximation (sections 1-3) 2 weeks
- Chapter 17: General Measure Spaces, Their Properties and Construction (sections 1-2) 1 week
- Chapter 18: Integration Over General Measure Spaces (sections 1-3) 1 week