

King Fahd University of Petroleum & Minerals  
Department of Mathematics and Statistics

MATH 311(Term 101)

Course Syllabus

**Course Instructor:** Dr. Abdelkader Boucherif

**Recommended Text:** “A First Course in Real Analysis” by Protter & Morrey, 2<sup>nd</sup> Ed, Springer (1991)

**Main Topics to be Covered:** The Real Number System, Continuity and Limits, Basic Properties of Functions on  $\mathbf{R}^1$ , Elementary Theory of Differentiation, Elementary Theory of Integration.

**Course Objectives:** This course is designed to provide a rigorous mathematical basis for the analysis of “Functions of One Variable”. Theorems usually stated without proof in elementary calculus courses will be completely proved in this course.

**Students Learning Outcome:** After completion of the course, the students should be able to

- Analyse a mathematical statement
- Identify hypothesis and conclusion(s) from the statement of a mathematical result
- Identify the set of mathematical results that lead to the proof of a statement
- Compose the arguments leading to the proof of a mathematical statement
- Acquire, whenever appropriate, a geometrical feeling of a statement
- Apply the results to solve exercises, mostly theoretical in nature

**Course Evaluation Policy:**

Exam I: 25% - Exam II: 25% - Final Exam: 40% - Assignment: 10%

**Policy about Unexcused Absences:** According to the University rules, a student missing 9 classes during the term without a valid excuse will be awarded “DN Grade”.

It is responsibility of the student to be aware of the date of the class he missed. The student is advised to present a valid excuse of a missed class within a week. An excuse will be regarded as valid if it is endorsed by the Office of the “Students Affairs”. In case of illness, the information released by the University Clinic will be acceptable.

**Office #:** 5-417

**Phone:** 4194

**e-mail:** [aboucher@kfupm.edu.sa](mailto:aboucher@kfupm.edu.sa)

**Office Hours:** S 14:10-15:00; M-W 10:50-11:50 or by appointment

### Weekly Coverage of Course Material

Week	Date	Section	Topic
1	Sept.25-29	1.1 1.2	Axioms for a Field Natural Numbers and Sequences
2	Oct. 2-6	1.3 1.4	Inequalities Mathematical Induction
3	Oct. 9-13	1.4 2.1	Mathematical Induction (contd.) Continuity
4	Oct. 16-20	2.2 2.3	Limits One-Sided Limits
5	Oct. 23-27	2.4 2.5	Limits at Infinity; Infinite Limits of Sequence
6	Oct.30- Nov.3	3.1 3.2	The Intermediate-Value Theorem Least Upper Bound; Greatest Lower Bound
7	Nov. 6-10	3.3 3.4	The Bolzano-Weierstrass Theorem The Boundedness and Extreme-Value Theorems
Nov.11- Nov.21	Eid	Al- Adha	Vacation
8	Nov.22-24	3.5	Uniform Continuity
9	Nov.27- Dec.1	3.6	The Cauchy Criterion
10	Dec. 4-8	3.7	The Hein-Borel and Lebesgue Theorems
11	Dec. 11-15	4.1	The Derivative in $\mathbf{R}^1$
12	Dec. 18-20	4.2	Inverse Functions in $\mathbf{R}^1$
13	Dec. 22-29	5.1	The Darboux Integral for Functions on $\mathbf{R}^1$
14	Jan. 1-5	5.2	The Riemann Integral
15	Jan. 8-15	5.3	The Logarithmic and Exponential Functions