King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences

MATH 311(052)

Course Syllabus

Course Instructor: Dr. Mohamed A. El-Gebeily

Recommended Text: "A First Course in Real Analysis" by Protter & Morrey, 2nd Ed, Springer (1991)

Main Topics to be Covered: The Real Number System, Continuity and Limits, Basic Properties of Functions on $\boldsymbol{R}^1$, 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

Computer Usage: The course does not require any kind of computer software. However, software such as matlab, maple or mathematica may, in some cases, provide a deeper understanding of the theoretical concepts involved in this course.

Course Evaluation Policy:
Exam I20% Exam II 20% Exam III 20% Final Exam 35% Homework 5%

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.

Late Comers: A student coming late in the class will be awarded ½ absence.

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Office Hours: SMW: 11:00-11:50 or by appointment

Weekly Coverage of Course Material

Week	Date	Section	Topic
1	Feb 12-15	1.1 1.2	Axioms for a Field Natural Numbers and Sequences
2	Feb 18-22	1.3 1.4	Inequalities Mathematical Induction
3	Feb 25-Mar 1	1.4 2.1	Mathematical Induction (contd.) Continuity
4	Mar 4-8	2.2 2.3	Limits One-Sided Limits
5	Mar 11-15	2.4 2.5	Limits at Infinity; Infinite Limits Limits of Sequence
6	Mar 18-22	3.1 3.2	The Intermediate-Value Theorem Least Upper Bound; Greatest Lower Bound
7	Mar 25-29	3.3 3.4	The Bolzano-Weierstrass Theorem The Boundedness and Extreme-Value Theorems
8	Apr 3-5	3.5	Uniform Continuity
9	Apr 8-12	3.6	The Cauchy Criterion
10	Apr 15-19	3.7	The Hein-Borel and Lebesgue Theorems
11	Apr 22-26	4.1	The Derivative in $\boldsymbol{R}^1$
12	Apr 29-May 3	4.2	Inverse Functions in $\boldsymbol{R}^1$
13	May 6-10	5.1	The Darboux Integral for Functions on $\boldsymbol{R}^1$
14	May 13-17	5.2	The Riemann Integral
15	May 20-24	5.3	The Logarithmic and Exponential Functions
16	May 27-28		Review