

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

Math. 311-151 Revised

Course Description and Syllabus

Course Instructor: Professor Abdelkader Boucherif

Recommended Text: Introduction to Real Analysis” by Robert G. Bartle & Donald R. Sherbert, 3rd Ed, Wiley (2000)

Topics to be Covered:

The real number system. Sequences and series of real numbers. Theory of sequences and series of functions. Real functions of one real variable: limit, continuity and differentiability. Fundamental theorems for functions defined on a compact real interval. The Riemann integral and the fundamental theorem of calculus. The first and second mean value theorems of integral calculus.

- **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.
 - Prepare the students for higher level analysis courses

Computer Usage: Computer software is not required in this course, however, the student is encouraged to use packages such as Maple, Mathematica,... etc.

Weekly Coverage of Course Material

Wk			Material
1	Aug 23-27	2.1-2.2	The algebraic and order properties of the absolute value -The real line
2	Aug 30 - Sep 3	2.4	Mathematical Induction- Applications of the Supremum property
3	Sep 6 -10	3.1	Sequences and their limits
4	Sep 13 - 17	3.4-4.1	Subsequences and Bolzano-Weierstrass Theorem - Limits of functions
***	Eid Al-Adha	Vacation	*****
5	Oct 4 - 8	4.2- 5.1	Limit Theorems- Continuous functions
6	Oct 11-15	5.4	Continuous functions on a compact interval- intermediate value theorem-
7	Oct 18 - 22		Uniform continuity- Maximum and Minimum
8	Oct 25 - 29	5.6	Monotone and Inverse functions-Applications
9	Nov 1- 5	6.1 6.2	The Derivative in \mathbb{R}^1 . Rolle's Theorem
10	Nov 8 - 12	6.4	The Mean Value Theorem -Taylor's Theorem
11	Nov 15 - 19	7.1	The Riemann Integral
12	Nov 22- 26	7.2-7.3	Riemann integrable Functions The Fundamental Theorem of Calculus
13	Nov 29 – Dec 3		First and Second mean value theorems of integral calculus
14	Dec 6 - 10	9.1-9.2	Theory of sequences and series of functions
15	Dec 13- 17	9.3-9.4	Uniform Convergence
	Dec 20 - 31	Final	Examinations