



Philadelphia University
Faculty of Science
Department of Basic Sciences and Mathematics
First Semester 2008/2009

Course Syllabus			
Course Title	Real Analysis I	Course Code	250311
Course Level	"3"	Course Prerequisite	"Set Theory"
Lecture Time	Sun, Tue, Thu. 8:10–9:00	Credit Hours	"3"

Academic Staff Specific				
Name	Hussien Albadawi	Office Hours	Sun.	10:00 – 11:00
Rank	Ass. Prof.		Mon	09:30 – 11:00
Office Number	"819"		Tue.	10:00 – 11:00
Location	Faculty of Science		Wed.	09:30 – 11:00
E – mail	hbadawi@philadelphia.edu.jo		Thu.	10:00 – 11:00

Course Description:

This course is intended to familiarize the students with the basic concepts, principles and methods of real analysis and its applications.

The course covers many of important subjects. It starts with **Real numbers** and ends with **Continuity**. Between these two subjects, the student will deal with new subjects like **Sequences of Real numbers and Limits**. Also, the student will learn about **Infinite series**.

Course Objectives:

1. Define the limit and related concepts and illustrate them with typical examples.
2. Understand and prove the density theorem and the Archmedian property.
3. Understand the properties of sequences and the fundamental theorems.
4. Derive and apply the basic properties of real numbers.
5. Prove the fundamental theorems for continuity.
6. Apply the concept of continuity and prove the main properties for uniformly continuous functions.

Course components (Text Book):

Title : Introduction to Real Analysis
Author : Bartle and Sherbert
Publisher : John Wiley & Sons., Inc
Edition : 3rd
Year : 2000
ISBN : 0-471-32148-b

Teaching methods:

1. Understand properties of real numbers.
2. Use the properties of real numbers to prove the fundamental theorems.
3. Use the properties of sequences to prove some important theorems.

Learning outcomes:

- **Knowledge and understanding**
 1. To give the student the necessary information to deal with mathematical problems.
 2. To give the student the necessary mathematical tools for further study in pure mathematics
 3. To demonstrate the ability of using Real analysis in solving mathematical problems.
- **Cognitive skills (thinking and analysis).**

To identify and solve problems. Work with given information and handle mathematical proofs based on mathematical theorems.
- **Communication skills (personal and academic).**

Encourage the students to be self-starters (creativity, decisiveness, initiative) and to finish the mathematical problems properly (flexibility, adaptability). Also to improve general performance of students through the interaction with each other in solving different mathematical problems.
- **Practical and subject specific skills (Transferable Skills).**

Gaining knowledge and experience of working with many pure mathematical problems.

Assessment instruments

Allocation of Marks	
Assessment Instruments	Mark
First Examination	20
Second Examination	20
Homeworks and Quizzes	10
Final Examination	50
Total	100

Module references:

Title : Mathematical Analysis
Author : S.C. Malik
Publisher : John Wiley & Sons., Inc
Edition : 2^{ed} edition
Year : 1994
ISBN : 81-224-0323-9

Expected workload:

On average students need to spend, at least, 6 hours of study and preparation per week for this course.

Attendance policy:

Absence from lectures shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Course/module academic calendar

week	Basic and support material to be covered
(1)	Preliminaries: 1. Sets. 2. Functions. 3. Mathematical Induction.
(2)	Real numbers: 1. The Algebraic properties of \mathbb{R} . 2. Applications. 3. The Order properties of \mathbb{R} .
(3)	4. The completeness property of \mathbb{R} . 5. The Archimedean principle in \mathbb{R} . 6. The Archimedean principle in \mathbb{R} .
(4)	Sequences: 1. Limit of a sequence. 2. Applications. 3. Convergent sequence.
(5)	4. Monotone and bounded sequences. 5. Applications. 6. Subsequences and limit points.
(6) First examination	7. Cauchy sequences.
(7)	8. Bolzano –Weierstrass Theorem. 9. Properties. 10. Monotone and bounded theorem.
(8)	Limits 1. Limits of real valued functions. 2. Applications. 3. Definition of limits by neighborhoods.
(9)	4. Definition of limits by sequences. 5. Properties of Limits. 6. Applications. The sequential theorem.
(10)	Continuity 1. Continuous functions on \mathbb{R} . 2. Sequences definition and neighborhoods definition of continuity. 3. Limit and Continuity.
(11) Second examination	4. Properties of continuous Functions.
(12)	Uniform Continuity: 1. Open sets, closed sets bounded sets in \mathbb{R} . 2. compact sets in \mathbb{R} . 3. Uniformly continuous functions.
(13)	4. Boundedness of continuous functions on compact intervals.. 5. Applications. 6. The extreme value theorem.
(14)	7. The intermediate value theorem. 8. The sequential criterion for uniform continuity 9. Properties and Examples.
(15) Final Examination	1. Review.