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

Course Syllabus

Course Title	Real Analysis II	**Course Code**	250312
Course Level	"4"	**Course Prerequisite**	250311 "Real Analysis I"
Lecture Time	Mon, Wed. 12:45–14:00	**Credit Hours**	"3"

Academic Staff Specific

Name	Hussien Albadawi	**Office Hours**	Sun.	10:00 – 11:00
Rank	Assistant. Prof.		Mon	011:15 – 12:30
Office Number	"819"		Tue.	12:00 – 13:00
Location	Faculty of Science		Wed.	011:15 – 12:30
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 **Differentiation** and ends with **The generalized Rimann integral**. Between these two subjects, the student will deal with new subjects like **The Rimann integral and Sequences of functions.** Also, the student will learn about **Infinite series.**

Course Objectives:

1. Define the derivative and related concepts and illustrate them with typical examples.
2. Understand and prove the mean value theorem and L'Hospital's rules.
3. Understand the theory of Rimann integral and the fundamental theorems.
4. Derive and apply the basic properties of exponential, logarithmic, and trigonometric functions.
5. Prove the fundamental theorems for series convergence.
6. Apply the generalized Rimann integral and prove the main properties.

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 derivative.
2. Use the properties of Rimann integral to prove the fundamental theorems.
3. Use the properties of series to prove some important theorems.

Learning outcomes:

- **Knowledge and understanding**
    1. To give the student the necessary information to deals 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. Real numbers. 2. Limits. 3. Continuous Functions.
(2)	**Differentiation:** 1. The Derivative. 2. Applications. 3. The Mean Value Theorem.
(3)	4. Applications. 5. L'Hospital's Rule. 6. Taylor's Theorem.
(4)	**The Rimann Integral:** 1. The Rimann Integral. 2. Applications. 3. Properties.
(5)	4. Rimann Integrable Functions. 5. Applications.
(6) **First examination**	6. The Fundamental Theorems.
(7)	7. Approximate Integration. 8. Properties. 9. Applications.
(8)	**Sequences of Functions** 1. Point wise Convergence 2. Applications. 3. Uniform Convergence.
(9)	4. Interchange of Limits. 5. The Exponential Function. 6. Properties of the Exponential Function.
(10)	7. The Logarithmic Function. 8. Properties of the Logarithmic Function. 9. The Trigonometric Functions.
(11) **Second examination**	10. Properties of the Trigonometric Functions.
(12)	**Infinite Series:** 1. Absolute Convergence. 2. Tests for Absolute Convergence.
(13)	3. Tests for Nonabsolute Convergence. 4. Applications. 5. Properties of Convergence.
(14)	6. Series of Functions. 7. Properties.
(15)	**The generalized Rimann integral** 1. Definition and Main Properties.
(16) **Final Examination**	2. Lebesgue Integral.