COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Mathematics			**NQF level**	5
Course Title	Real Analysis I	**Code**	505307	**Prerequisite**	505245
Credit Hours	3	**Theory**	3	**Practical**	0
Course Leader	Prof. Dr. Mohammad W. Alomari	**email**	malomari@jadara.edu.jo		
Lecturers	Prof. Dr. Mohammad W. Alomari	**emails**	malomari@jadara.edu.jo		
Lecture time	08:30-10:00 Mon., Wed.	**Classroom**	D010	**Attendance**	Fulltime
Semester	Second Semester 2023\2024	**Production**	2008	**Updated**	2024

Short Description

This course covers 6 Chapters, each of which is divided into several topics:

- The properties of real numbers and their main postulates are discussed.
- The concept of Metric Spaces is considered; preciously; the open set, closed set, closure set, compact set, and connected set are studied in detail.
- The concept of real sequence in general metric spaces is considered. The main theory of real sequences in real metric space is also covered.
- The concept of continuity of real function in a metric space is defined. The main famous theory of continuous functions is covered.
- The concept of derivative of a real function and general theory of differentiation are studied. The concept of monotonic function is also covered.
- The Definition of Riemann-Stieltjes integrals and related basic theory of integration.

Course Objectives

Learning the basic and important properties of real filed

Learning Outcomes

A. Knowledge - Theoretical Understanding

a1) Discuss fundamentals and basic properties of the real field, sequences, continuity of functions, differentiation, and integrability of real functions. a2) Learn the concepts of Metric space, related concepts, and its importance in the theory of real functions.
B. Knowledge - Practical Application
b1) Demonstrate the fundamental concepts of real function theory in metric spaces b2) Able to construct proofs of some fundamental theorems in metric spaces.
C. Skills - Generic Problem Solving and Analytical Skills
c1) Use theory of real functions in metric spaces in constructing proofs and solving problems.
D. Skills - Communication, ICT, and Numeracy
E. Competence: Autonomy, Responsibility, and Context
Teaching and Learning Methods
Lectures, discussions, and solving selected problems.
Assessment Methods
• Discussion and Interaction • Mid Term Exam, Final exam, Class Assignment Quizzes,

Course Contents						
Week	**Day**	**Hours**	**CLOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1.	Mon	1.5	a1, a3, b2.	The real field: concepts and properties	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1, a3, b2.	The real field: concepts and properties		
2.	Mon	1.5	a1, b1, b2	Metric space: Definition and examples	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1, b1, b2	Closure, Interior, limit points		
3.	Mon	1.5	a1, a2. a3, b2,	Open and closed sets in metric spaces	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1, a2. a3, b2,	Definition of Compact Sets and examples		
	Mon	1.5	a1, b2. a3	Related facts about compact sets	Lecturing, examples,	Quizzes Assignments

4.	Wen	1.5	a1, b2. a3	Connected sets in metric spaces	Discussion	
5.	Mon	1.5	a1, b1,	Definition of Sequences and Basic properties	Lecturing, examples, Discussion	Assignments
	Wen	1.5	a1, b1,	Important theorems related to sequences		
6.	Mon	1.5	a1, b2,	Tests of Series: constructions and proofs	Lecturing, examples, Discussion	Assignments
	Wen	1.5	a1, b2,	Continuity of functions in Metric spaces		
7.	Mon	1.5	a1, b2. a3	Continuity of functions in Metric spaces	Lecturing,	Assignments
8.	Wen	1.5	a1, b2. a3	Continuity and compactness	examples, Discussion	
8.	Mon	1.5	a1, b2. a3	Continuity and connectedness	Lecturing, examples, Discussion	Mid -Exam
	Wen	1.5	a1, b2. a3	Differentiation of real functions		
9.	Mon	1.5	a2, a3	Monotone and convex functions	Lecturing, examples, Discussion	Assignments
	Wen	1.5	a2, a3	Riemann-Stieltjes integrals: Definitions: Darboux approach		
10.	Mon	1.5	a2, a3	Refinements of Partitions and their properties	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a2, a3	Riemann Definition of integral: Riemann equivalent definition		
11.	Mon	1.5	a1, b2. a3	Practical examples and related consequences about Riemann – Stieltjes integrals	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1, b2. a3	Important theorems		
12.	Mon	1.5	a1, b2. a3	Fundamental theorem of Integrals and related facts	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1, b2. a3	Changing of variables and integration by parts		
13.	Mon	1.5	a1	Absolute continuity and bounded variation of real functions	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1	Absolute continuity and bounded variation of real functions		
14.	Mon	1.5	a1	Step function and its integration	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1	Step function and its integration		

15.	Mon	1.5	a1, a3	Differentiation under integral sign: Construction and proof	Lecturing, examples, Discussion	Quizzes Assignments
	Wen	1.5	a1, a3	Practical examples		
16.		Final Exam				

Infrastructure	
Textbook	Principles of Mathematical Analysis, By Walter Rudin
References	1- Basic Real Analysis, By Anthony W. Knapp, Birkhäuser Boston 2005 2- Mathematical Analysis, Tom Apostol, 2nd ed, Addison-Wesley 1974
Required reading	
Electronic materials	
Other	

Course Assessment Plan							
Assessment Method		**Grade**		**CLOs**			
			a1	a2	b1	b2	c1
First (Midterm)		30	10	10	10		
Second (if applicable)		0					
Final Exam		50	5	5	5	15	20
Coursework							
Coursework assessment methods	Assignments						
	Case study						
	Discussion and interaction	5		5			
	Group work activities	-					
	Lab tests and assignments	5			5		
	Presentations	-					
	Quizzes	10				5	5
Total		100	15	20	20	20	25

Plagiarism

Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).
Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.

مدرس المادة
أ.د. محمد العمري

رئيس القسم
د. طارق القواسمة