اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Real Analysis 1
Course Code:	MTH 381
Program:	BS-Mathematics
Department:	Mathematics
College:	College of Sciences, AlZulfi
Institution:	Majmaah University, Saudi Arabia

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Table of Contents

A. Course Identification

1. Credit hours: 3(2+1)	

2. Course type

a. University ☐ College ☐ Department ☑ Others ☐

b. Required ☑ Elective ☐

3. Level/year at which this course is offered: 5th Semester /3rd year

4. Pre-requisites for this course (if any)**:** MTH 203

5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	75%
2	**Blended**	0	0%
3	**E-learning**	0	0%
4	**Distance learning**	0	0%
5	**Other**	15	25%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	0
3	**Tutorial**	0
4	**Others** (specify)	15
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description :

Basic Properties of the field of real numbers – completeness axiom - Series and their convergence – monotone sequences – Bolzano-Weirstrass theorem – Cauchy criterion- Basic topological properties of the real numbers- Continuous and differentiable functions and their properties – Definition of Riemann integral- Darboux and Riemann sums - Properties and the principle theorem in calculus. Sequence and Series of functions- Pointwise convergence and uniform convergence

2. Course Main Objective

- Studying basic properties of the field of real numbers – completeness axiom - series and their convergence – monotone sequence – Bolzano-Weirstrass theorem -Learning Cauchy criterion
- Basic topological properties of the real numbers-
- Learning continuous and differentiable functions and their properties – Uniform continuity and the difference between them
- Studding Riemann integral- Darbox integral and Riemann sums   properties and the principle theorem in calculus.
- Studding a sequence , series of functions, poinwise convergence, uniform convergence

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Basic Properties of Field** What is real line? What is Field? Properties of Field in real numbers	
1.2	**Completeness Axioms** What is Supremum and Infimum? What is bounded set? What is maximum and minimum set?	
1.3	**Convergent & Divergent Sequence** What is convergent sequence? What is bounded sequence? What is Cauchy sequences? What is Squeeze theorem?	
1...		
2	**Skills :**	
2.1	**Solve** the limit of sequence by using definition	
2.2	**Solve** the limit of sequence by using different approach	
2.3	**Find** out the supremum and Infimum of the set and check the completeness axioms	
2...		
3	**Values:**	
3.1	**Ability** to work in a team to understand the problem	
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Basic Properties of the field of real numbers	6
2	completeness axiom	6
3	Series and their convergence – monotone sequences – Bolzano-Weirstrass theorem – Cauchy criterion	9
4	Basic topological properties of the real numbers- Continuous and differentiable functions and their properties –	9

5	Definition of Riemann integral- Darboux and Riemann sums - Properties and the principle theorem in calculus	9
6	Sequence and Series of functions- Pointwise convergence and uniform convergence	6
Total		45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	**Basic Properties of Field** What is real line? What is Field? Properties of Field in real numbers	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
1.2	**Completeness Axioms** What is Supremum and Infimum? What is bounded set? What is maximum and minimum set?	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
1.3	**Convergent & Divergent Sequence** What is convergent sequence? What is bounded sequence? What is Cauchy sequences? What is Squeeze theorem?	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.0	**Skills**		
2.1	**Solve** the limit of sequence by using definition	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.2	**Solve** the limit of sequence by using different approach	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.3	**Find** out the supremum and Infimum of the set and check the completeness axioms	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
3.0	**Values**		
3.1	**Ability** to work in a team to understand the problem	• Group discussion	• Exercise • Electronic MCQ Test
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4th Week	2.5%
2	Assignment/Home Work 1	5th Week	2.5%
3	Mid Term 1	7th Week	20%
4	Quiz 2	9th Week	2.5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
5	Assignment /Home Work 2	10th Week	2.5%
6	Class Activities/Discussions	10th Week	5%
7	Mid Term 2	12th Week	20%
8	Electronic Test	13th Week	5%
9	Final Exam	---	40%
	Total		100%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Department of mathematics has "**Student Academic Advisory Committee**". This committee is responsible for students counseling and advising works in synchronization and collaboration with the Deanship of Admissions and Registration and Student Affairs. Department of mathematics Alzulfi has a continuous and standardized procedure that be associated with the student's progress until completion of degree and includes psychological, social and behavioral guidance. This advisory committee also maintain the student's files. The students with GPA below than 50 % in Mid 1 and Mid 2 are stayed under serious observation and continuous consultations with respective course instructor about their performing. The course teacher will commit to a minimum scheduled time for student consultation equivalent to **2 HOURS PER WEEK**

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	R .Bartle and D .Sherbert , Introduction to Real Analysis, John-Wiley Sons, 2011 ISBN: 978-0-471-43331-6
Essential References Materials	1) Elias Zakon, Mathematical Analysis, trillia group, 2011. ISBN : 978193170502
Electronic Materials	MIT Open Courses
Other Learning Materials	1) https://www.wolfram.com/mathematica/

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- The size of the room should be proportional to the number of students - Provide enough seats for students.

Item	Resources
	- The number of students do not exceed on 30 in the classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	- Mathematics Lab is equipped with a computer. - Provide overhead projectors and related items i.e smart Board, Wi-Fi, AV. - Updated Math Software i. e Mathematica, Matlab, Maple. etc
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Extent of achievement of course learning outcomes	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources.	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Mathematics Department
Reference No.	27
Date	8/8/1442 H -21/3/2021 G

Head of Department

Dr. Muqrin Almuqrin