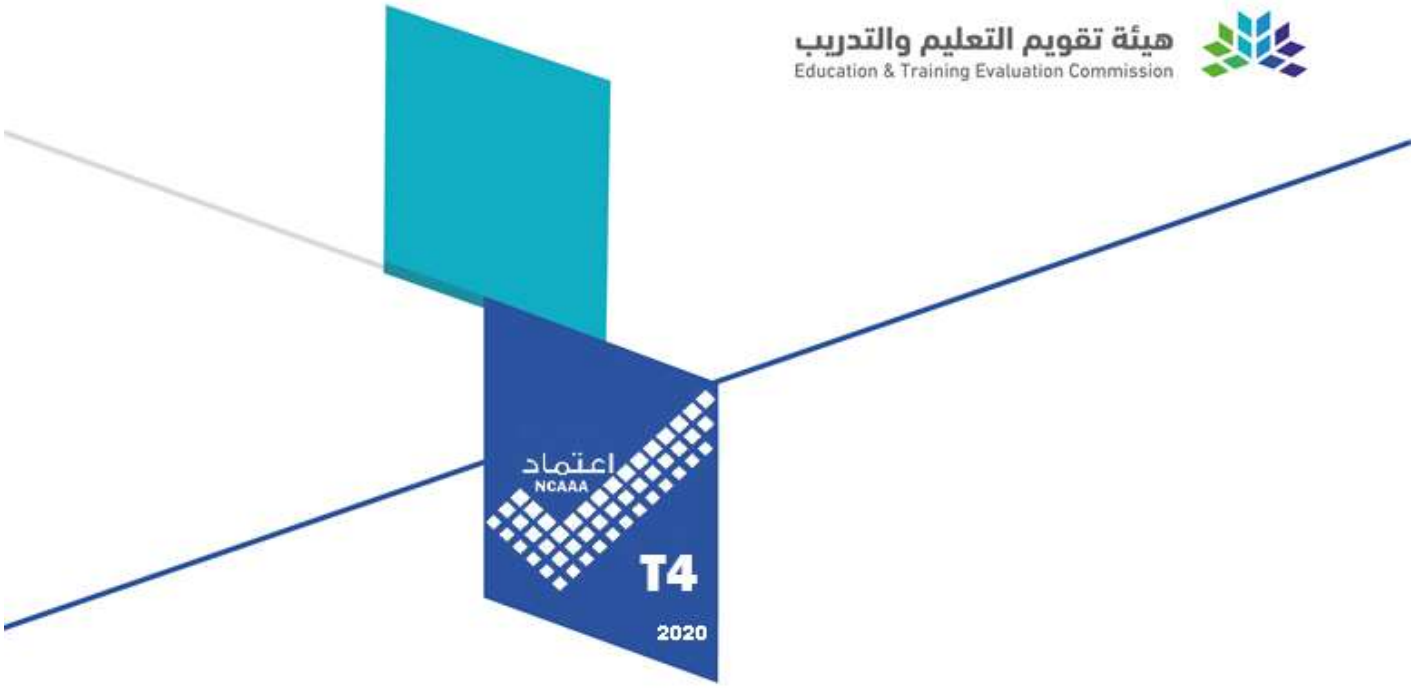
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Real Analysis 2**
Course Code:	**417 Math**
Program:	**B. Sc. in Mathematics**
Department:	**Mathematics**
College:	**College of Science**
Institution:	**Jazan University**

Table of Contents

A. Course Identification

1. Credit hours:	**3**
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	**Level 5/Year 3**
4. Pre-requisites for this course (if any)**:**	**315 Math**
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	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**27**
2	**Laboratory/Studio**	
3	**Tutorial**	**3**
4	**Others** (specify)	
	Total	**30**

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to provide students with

- **Riemann Integral**: Definition of Riemann integral, Riemann criterion for integrability, the integrability of monotone and continuous functions, properties of Riemann integral, First-second Fundamental Theorem, Integration by Parts, first-second substitution theorems, Mean value theorem, Tailor theorem, Improper Integrals, Liner Integrals.
- **Infinite Series**: Convergence of infinite series, tests for Convergence, Cauchy criterion for series, absolute convergence, rearrangement of Series, tests for absolute convergence, alternating series, Abel's test, Dirichlet's test.
- **Sequences and Series of Functions**: Pointwise and uniform convergences, Cauchy criterion, Weierstrass theorem, series of functions, differentiation and integration of series of functions, Uniqueness theorem, Tailor Series, Fourier Series.

2. Course Main Objective

After finishing the course, the student is expected to be familiar with the following:

- Evaluation of the area using Riemann sums.
- Using the difference mathematical proof methods to prove some fundamental theorems in analysis
- Using the fundamental theorems to evaluate Riemann integrals
- Distinction between the uniform and pointwise convergence of sequence of functions
- Using the convergent tests of numerical series and series of functions

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Distinguish mathematical concepts relevant to pure and applied mathematics of Riemann Integral, Infinite Series, and Sequences and Series of Functions.	K1
1.2	Identify background science, features and structure of mathematical problem in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	K2
1.3	Explain notations and concepts required for the solution of Mathematical problem Riemann Integral, Infinite Series, and Sequences and Series of Functions.	K3
2	**Skills :**	
2.1	Apply theoretical, computational or practical aspect relevant to course Content of Riemann Integral, Infinite Series, and Sequences and Series of Functions.	S1
2.2	Compute numerical quantities for various parameters to approximate the solution in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	S2
2.3	Apply various mathematical rules, techniques and theorems in Application in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	S3
2.4	Solve mathematical problem using critical thinking in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	S4
3	**Values:**	
3.1	Cultivate a mathematical attitude and nurture the interest.	V1
3.2	Realize the importance of responsibilities through different modes of practice, competition and related activities.	V2
3.3	Inculcating values and ethics in thought, expression and deed.	V3

C. Course Content

No	List of Topics	Contact Hours
1	**Concepts and definitions**	8
2	**Riemann Integral**	10
3	**Infinite Series**	8
4	**Sequences and Series of Functions**	4
Total		30

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	Distinguish mathematical concepts relevant to pure and applied mathematics of Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, Web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.2	Identify background science, features and structure of mathematical problem in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, Web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.3	Explain notations and concepts required for the solution of Mathematical problem Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, Web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.0	**Skills**		
2.1	Apply theoretical, computational or practical aspect relevant to course Content of Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, problem solving, web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.2	Compute numerical quantities for various parameters to approximate the solution in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, problem solving, web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.3	Apply various mathematical rules, techniques and theorems in Application in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, problem solving, web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.4	Solve mathematical problem using critical thinking in Riemann Integral, Infinite Series, and Sequences and Series of Functions.	Lectures, problem solving, web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
3.0	**Values**		
3.1	Cultivate a mathematical attitude and nurture the interest.	Group work, problem solving, web based work	Assignments
3.2	Realize the importance of responsibilities through different modes of practice, competition and related activities.	Group work, problem solving, web based work	Assignments
3.3	Inculcating values and ethics in thought, expression and deed.	Group work, problem solving, web based	Assignments

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		work	

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework	3	5%
2	First exam.	6	20%
3	Second exam.	12	20%
4	Homework	14	5%
5	Final exam.	16	50%

***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 :

Each group of students assigned to a member of staff who will be available for help and academic guidance office hours at specific hours on daily basis. At least be available 8 hours per week.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Introduction to Real Analysis, R.G. Bartle and D.G. Sherbert, 3rdEdition. John Wiley and Sons, New York,(2000)
Essential References Materials	-Introduction to Real Analysis, M. Stoll 2ndEdition, Addison –Wesley Longman, Boston, (2001) - Elementary Analysis: Theory of Calculus, K.A. Ross Springer-Verlag New York, (1980) - Principles of complex analysis, D. Mahmoud Kutkut, House Sunrise 1990
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom, Computer lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show; Smart Board, Mathematics software.
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	Students, Peer and program leader	Indirect (Course Evaluation Survey)- Indirect peer evaluation
Assessment	Students, Program assessment committee	Direct/ Indirect
Extent of achievement of course learning outcomes	Instructor	Direct/Indirect
Quality of learning resources	Students, Faculty members	Indirect

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	**Board Of Mathematics Department**
Reference No.	**12th Meeting Of The Board Of Mathematics Department 1441-1442**
Date	**14/6/1442 A. H.; 27/1/2021 A. D.**