



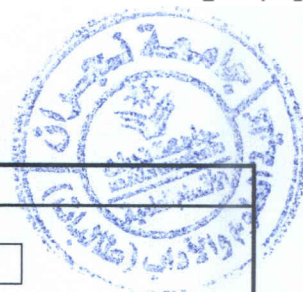
# Course Specifications

<b>Course Title:</b>	<b>Real Analysis 1</b>
<b>Course Code:</b>	<b>371 Math-3</b>
<b>Program:</b>	<b>Mathematics</b>
<b>Department:</b>	<b>Mathematics</b>
<b>College:</b>	<b>College of Science and Arts</b>
<b>Institution:</b>	<b>Najran University</b>



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## A. Course Identification

<b>1. Credit hours:</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	Others <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> ٤ / ٢			
<b>4. Pre-requisites for this course (if any):</b> Calculus (1) 112Math 3			
<b>5. Co-requisites for this course (if any):</b>  None			

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	٣	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	3
	<b>Total</b>	48
<b>Other Learning Hours*</b>		
1	Study	30
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	
5	Other (Office hours)	15
	<b>Total</b>	65
<b>Total Learning Hours</b>		113

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

### 1. Course Description

#### Course Description

This course introduces the fundamental concepts of the field of real numbers, finite and infinite sets, countable and uncountable sets. Also, it covers the basic topology of real numbers such as neighborhoods, open and closed sets, compactness and Heine-Borel theorem. The course provides knowledge of convergence for sequences and Cauchy sequences. Cauchy sequences used for completion of metric spaces. Finally, limits, continuity, differentiation and basic theorems both in the limit, continuity and derivation are demonstrated..

### 2. Course Main Objective

1. Provide students with scientific facts and concepts about the field of real numbers, field axioms and axioms of order.
2. Providing students with an appropriate amount of information that helps to understand the concepts of sequences, continuity, and differentiation, basic theories in both continuity and differentiation
3. Give students knowledge of absolute convergence and absolute closeness
4. Distinguish between major groups and their characteristics through examples.
5. Training students on how to distinguish between convergence of sequences and endings and continuity of functions. The tendency to take responsibility for learning through designated tasks.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe the real line as a complete ordered field.	
1.2	Define finite, infinite, countable, open, closed, bounded, compact sets, limit, continuity, differentiability of functions defined on subsets of the real line	
1.3		
1...		
2	<b>Skills :</b>	
2.1	Provide proofs of theorems of real convergence sequences.	
2.2	Provide proofs of theorems of the continuity - differentiation of real functions and in the neighborhood of real line.	
2.3	Distinguish between finite and infinite sets-countable and uncountable set - open and closed sets .	
2.4	Provide proofs of theorems density of real line.	
3	<b>Competence:</b>	
3.1	Presents the principle concepts of real analysis are clearly.	
3.2	Show critical thinking mathematical to solve many problems in his specialty.	
3.3		
3...		

### C. Course Content

No	List of Topics	Contact Hours
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1	Field of Real numbers (field axioms and their properties, ordering axiom, Completeness axiom, well-ordering principle, density of rational numbers in the set of real numbers, Properties of absolute value, Intervals,	9
2	Finite and infinite sets, Countable and non-countable sets. Basic Topology of real numbers: Neighborhoods, open and closed sets, compactness and Heine-Borel theorem.	9
3	Sequences (the concept of sequences, convergence of sequences, Cauchy sequences and complete metric spaces).	6
4	Limits and continuity of functions (the concept of the limits of functions, Theorems in Limits, concept of continuity, uniform continuity and compact (and complete) spaces	9
5	Differentiation (concept of derivatives - concept of Differentiable functions- mean value theorem and intermediate theorem- Roal's theorem -L'Hospital's theorem and their applications, Taylor's theorem)	12
...		
<b>Total</b>		<b>45</b>

### 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	<b>Knowledge .</b>		
1.1	Describe the real line as a complete ordered field	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Scientific discussions</li> </ul>	.Quiz .Written Exam
1.2	Define finite, infinite, countable, open, closed, bounded, compact sets, limit, continuity, differentiability of functions defined on subsets of the real line.	<ul style="list-style-type: none"> <li>•Lecture</li> <li>•Scientific discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Quiz</li> <li>• Written Exam</li> </ul>
...			
2.0	<b>Skills:</b>		
2.1	Provide proofs of theorems of real convergence sequences.	<ul style="list-style-type: none"> <li>•Lecture</li> <li>•Scientific discussions</li> </ul>	- Exercises - Homework - Quiz/Written Exam.
2.2	Provide proofs of theorems of the continuity - differentiation of real functions proofs in the neighborhood of real line, and proofs of theorems density of real line.	<ul style="list-style-type: none"> <li>•Lecture</li> <li>•Scientific discussions</li> </ul>	- Exercises - Assignments - Homework - Quiz - Written Exam
2.3	Distinguish between finite and infinite sets-countable and uncountable set – open and closed sets .	<ul style="list-style-type: none"> <li>•Lecture</li> <li>•Scientific discussions</li> </ul>	- Exercises - Assignments - Homework - Quiz - Written Exam
3.0	<b>Competence</b>		
3.1	Presents the principle concepts of real analysis are clearly	<ul style="list-style-type: none"> <li>•Lecture</li> <li>•Scientific discussions</li> </ul>	- Oral Exam - Rubrics
3.2	Show critical thinking mathematical to	Lecture	- Oral Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	solve many problems in his specialty.	•Scientific discussions	- Quizzes. - Rubrics
...			

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Exercises, Homework& Assignments	open	10%
2	Oral Exam and Rubrics	14th Week	5%
3	Quizzes	Open	5%
4	Written Test(1)	7th Week	15%
5	Written Test(2)	13th Week	15%
6	Final Exam	End of Semester	50%
7			
8			

\*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 :**

- Introducing the course syllabus, grading scale and the distribution of marks for the course in the first lecture of the course.
- Arrangements for availability of teaching staff for individual student consultations and academic advice (include amount of time teaching staff are expected to be available each week).
- Office hours for a teaching staff for one hour weekly.

## F. Learning Resources and Facilities

### 1.Learning Resources

<b>Required Textbooks</b>	1.Charles, C. P., Real Mathematical Analysis, Springer-Verlag New York, 2001. Kolmogorov, A
<b>Essential References Materials</b>	1.Fomin, S., Introductory Real Analysis, Mc Graw-Hill, New York, (Revised English translated and edited by "Siverman, R. A."), 1986. 2..Bridges, D. S., Foundations of Real and Abstract Analysis, Springer-Verlag New York, 1998. 3. Mali, S. C., Sativa Aurora, Mathematical Analysis, New Delhi, University of Delhi, 1992.
<b>Electronic Materials</b>	<a href="http://en.wikipedia.org/wiki/Real_analysis">http://en.wikipedia.org/wiki/Real_analysis</a>

	<a href="http://goushusa.smcvt.edu/real%20analysis">http:// goushusa.smcvt.edu/real analysis</a>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>CD-ROM containing the scientific subjects in the course</li> </ul>

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture Hall by the number of seats = 25 seat approximately
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> <li>Datashow</li> <li>Smart Board</li> <li>Wi Fi</li> </ul>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student course evaluation survey at the end of semester.	Students	Questionnaire (Indirect)
Effectiveness of teaching and assessment	Peer Reviewer	Rubrics (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

<b>Council / Committee</b>	
<b>Reference No.</b>	
<b>Date</b>	