



Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	08

1.	Course Title	Real Analysis I
2.	Course Number	0301213
3.	Credit Hours (Theory, Practical)	3+0
	Contact Hours (Theory, Practical)	3
4.	Prerequisites/ Corequisites	0301211
5.	Program Title	B.Sc.
6.	Program Code	
7.	School/ Center	Science
8.	Department	Mathematics
9.	Course Level	Bsc
10.	Year of Study and Semester (s)	all semesters
11.	Other Department(s) Involved in Teaching the Course	
12.	Main Learning Language	English
13.	Learning Types	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online
14.	Online Platforms(s)	<input checked="" type="checkbox"/> Moodle <input type="checkbox"/> Microsoft Teams
15.	Issuing Date	13-8-2024
16.	Revision Date	13-8-2024

**17. Course Coordinator:**

Name:	Dr. Saja Hayajneh	Contact hours:(S,T,W)
Office number:		Phone number:(N/A)
Email:		



### 18. Other Instructors:

Name:

Office number:

Phone number:

Email:

Contact hours:

Name:

Office number:

Phone number:

Email:

Contact hours:

### 19. Course Description:

The completeness property of  $\mathbb{R}$ . The archimedean principle in  $\mathbb{R}$ . Limit of a sequence. Convergent sequences. Monotone and bounded sequences. Cauchy sequences. Subsequences and limit points. Liminf and limsup of sequences of real numbers. Open sets, closed sets, bounded sets and compact sets in  $\mathbb{R}$ . Limits of real valued functions. Definition of limits by neighborhoods. Definition of limits by sequences. Continuous functions on  $\mathbb{R}$ . Sequence definition and neighborhood definition of continuity. Boundedness of continuous functions on compact intervals. The extreme value theorem. The intermediate value theorem. Uniformly continuous functions. The sequential criterion for uniform continuity. The derivative of functions. Rolle's Theorem. Mean value theorem. Taylor Theorem with remainder. L' Hospital's rule. The Riemann Stieltjes Integral. Fundamental Theorem of Calculus

### 20. Program Student Outcomes (SO's):

(To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

7. Utilize research methods, critical and creative thinking skills to assess and analyze information) to solve problems properly, then draw valid reasoning and logical conclusions leading to true consequences.



## 21.Course Intended Learning Outcomes (CLO's):

(Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. Discuss the concepts of cont. differential of integral of functions on  $\mathbb{R}$ .
2. Be prepared for the real analysis courses sequel to this course.
3. Be able to think in mathematical analysis.
4. Understand and R-S-integral.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1						
2						
3						
4						

## 22.The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program SO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)	SO (8)
Course CLO's								
CLO (1)								
CLO (2)								
CLO (3)								
CLO (4)								



### 23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types Face to Face (FF) Blended (BL) Fully Online (FO)	Platform Used	Synchronous (S) Asynchronous (A)	Evaluation Methods	Learning Resources
1	1.1	The completeness property of $\mathbb{R}$ .	7	FF	Teams	S	quiz	Text Book
	1.2	The Archimedean principle in $\mathbb{R}$ .	7	FF	Teams	S	quiz	Text Book
	1.3							
2	2.1	Limit of a sequence.	7	FF	Teams	S	quiz	Text Book
	2.2	Convergent sequences.	7	FF	Teams	S	quiz	Text Book
	2.3							
3	3.1	Monotone and bounded sequences.	7	FF	Teams	S	quiz	Text Book
	3.2	Cauchy sequences.	7	FF	Teams	S	quiz	Text Book
	3.3							
4	4.1	Subsequence s and limit points	7	FF	Teams	S	quiz	Text Book
	4.2	Liminf and limsup of sequences of real numbers	7	FF	Teams	S	quiz	Text Book
	4.3							
5	5.1	Open sets, closed sets,	7	FF	Teams	S	quiz	Text Book
		bounded sets and compact sets in $\mathbb{R}$ .						



	5.2							
	5.3							
6	6.1	Limits of real valued functions.	7	FF	Teams	S	quiz	Text Book
	6.2	Definition of limits by neighborhood s.	7	FF	Teams	S	quiz	Text Book
	6.3							
7	7.1	Definition of limits by sequences.	7	FF	Teams	S	quiz	Text Book
	7.2	Continuous functions on R.	7	FF	Teams	S	quiz	Text Book
	7.3	Sequence definition and neighborhood definition of continuity.	7	FF	Teams	S	quiz	Text Book
8	8.1	Boundedness of continous functions on compact	7	FF	Teams	S	quiz	Text Book
	8.2	The extreme value theorem	7	FF	Teams	S	quiz	Text Book
	8.3							
9	9.1	The intermediate value theorem.	7	FF	Teams	S	quiz	Text Book
	9.2	Uniformly continuous functions..	7	FF	Teams	S	quiz	Text Book
	9.3							
10	10.1	Thesquential criterion for uniform continuity.	7	FF	Teams	S	quiz	Text Book
	10.2	The derivative of functions..	7	FF	Teams	S	quiz	Text Book
	10.3	The intermediate value theorem.	7	FF	Teams	S	quiz	Text Book
11	11.1	Roles Theorem.	7	FF	Teams	S	quiz	Text Book
	11.2	Mean value theorem.	7	FF	Teams	S	quiz	Text Book
	11.3		7	FF	Teams	S		Text Book



12	12.1	Taylor Theorem with remainder.	7	FF	Teams	S	quiz	Text Book
	12.2							
	12.3							
13	13.1	L'Hospital,s rule.	7	FF	Teams	S	quiz	Text Book
	13.2							
	13.3							
14	14.1	The Riemann Stieitjes Integral	7	FF	Teams	S	quiz	Text Book
	14.2							
	14.3							
15	15.1	Fundamental Theorem of	7	FF	Teams	S	quiz	Text Book
		Calculus						
	15.2							
	15.3							
16							Final Exam	

#### 24.Evaluation Methods:

Opportunities to demonstrate achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Quiz 1	10		1,2	4	On campus
Quiz 2	10		2,3	7	On campus
Midterm exam	30		1,2,3	11	On campus
Final Exam	50		1,2,3,4	Final exams period	On campus



## 25. Course Requirements:

(e.g.: students should have a computer, internet connection, webcam, account on a specific software/platform...etc.):

Data show, Microsoft Teams account.

## 26. Course Policies:

According to university regulations, attendance is mandatory. If a student is unable to attend a class, then he/she should contact the instructor. If a student misses more than 10% of the classes without excuse, then he/she will be assigned a failing grade in class. In cases of extreme emergency or serious illness, the student will be allowed to make up the missed exams. Times and dates for makeup exams will be assigned later. There are severe sanctions for cheating, plagiarizing and any other form of dishonesty. The university regulations on cheating will be applied to any student who cheats in exams or on any homework.

- A. Attendance policies:
- B. Absences from exams and submitting assignments on time:
- C. Health and safety procedures:
- D. Honesty policy regarding cheating, plagiarism, misbehavior:
- E. Grading policy:
- F. Available university services that support achievement in the course:

## 27. References:

A- Required book(s), assigned reading and audio-visuals:

R. Bartle and D. Sherbert. Introduction to  
  
real analysis.

B- Recommended books, materials, and media:



## 28. Additional information:

Name of the Instructor or the Course Coordinator: <b>Dr. Saja Hayajneh</b>	Signature: .....	Date: 13-8-2024
Name of the Head of Quality Assurance Committee/ Department: <b>Prof. Manal Ghanem</b>	Signature: .....	Date: .....
Name of the Head of Department: <b>Prof. Baha Alzalg</b>	Signature: .....	Date: .....
Name of the Head of Quality Assurance Committee/ School of Science: <b>Prof. Emad A. Abuosba</b>	Signature: .....	Date: .....
Name of the Dean or the Director: <b>Prof. Mahmoud I. Jaghoub</b>	Signature: .....	Date: .....