



The University of Jordan Accreditation & Quality Assurance Center

Course Syllabus

<u>Course Name</u>: Mathematical Analysis II



Course Syllabus

1	Course title	Mathematical Analysis II			
2	Course number	(0301411)			
2	Credit hours	3			
3	Contact hours (theory, practical)	3			
4	Prerequisites/corequisites	(0301311)			
5	Program title	B.Sc. Mathematics			
6	Program code				
7	Awarding institution	The University of Jordan			
8	School	Science			
9	Department	Mathematics			
10	Course level	Core Specialization			
11	Year of study and semester (s)	3 rd or 4 th year, 1 st and 2 nd or summer semester			
12	Other department (s) involved in teaching the course	None			
13	Main teaching language	English			
14	Delivery method	□ Face to face learning □ Blended □ Fully online			
15	Online platforms(s)	□ Moodle □ Microsoft Teams □ Skype □ Zoom □ Others			
16	Issuing/Revision Date	Nov. 2, 2022			

17 Course Coordinator:

Name: Dr. Eman Aldabbas	Contact hours: 11:30-12:30 (Sun-Tue-Thu)
Office number: Math 312	Phone number:-
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18 Other instructors:

Name:	
Office number:	
Phone number:	
Email:	
Contact hours:	



19 Course Description:

As stated in the approved study plan.

As stated in the approved study plan. Liminf and limsup of sequences of real numbers: The definition using limit points. Basic properties of liminf and limsup. Series of real numbers: the definition and the algebraic properties. Convergence: the definition and the basic properties. Absolute and conditional convergence. Tests of absolute convergence (the general form: using liminf, and limsup.) (Ratio, nth root and comparison tests) Rearrangements of series. Abel test. Dirichlet test. Cesaro summability. Infinite product and its relation to infinite series. Sequences of functions: the definition and examples. Pointwise convergence. Uniform convergence of sequences of derivatives. Dini's Theorem. Uniform convergence and integrability on [a,b]. Uniform convergence of sequences of functions: definition and basic properties. Pointwise and uniform convergence of series of functions. Weierstrass M-test. Uniformly convergent series of continuous functions. Uniformly convergent series of integrable functions. Interchange of summation and integration. The space C[a,b]: the definition, metric and algebraic properties. The Weierstrass approximation theorem. Improper integral: Kinds of improper integral. Tests of convergence of improper integrals. Examples of functions represented by improper integral. (Gamma function, Beta function, Laplace transform)



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20 Course aims and outcomes:

- Aims This course will introduce the students to the concept of sequence and series of functions and deepen their understanding of the series of real numbers. The main aims of this course are:

1- To introduce the basic properties of real sequences and series.

2- To introduce different kinds of tests for determining the convergence of a series of positive terms.

3- To introduce the idea of absolutely convergence for a series of nonnegative terms.

4- To extend the idea of convergence of sequences and series of real numbers to sequences and series of functions.

5- To introduce different kinds of convergence of sequences and series of functions, and relate them to integration, continuity and differentiation.

6- To present the Weirstrass approximation Theorem and Arzela The

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

	SLO (1)	SLO	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)
	(.,	(-)	(0)	(')	(0)	(0)	(,,	(0)
1- Understand the definition of the	•						•	
limit of real sequences and series	-						_	
and their properties.								
2- Understand the definition of limit	•						•	
superior and limit inferior of real								
sequences.								
3- Understand the concept of	•						•	
alternating series, conditional								
convergent, absolute convergent								
and rearrangement of series.								
4- Understand the definition of	•						•	
point-wise convergent, uniform								
functions								
F. Understand the definition of								
5- Onderstand the definition of	•						•	
convergent of a series of functions								
6- Understand some	•						•	
consequences and relation	-							
between uniform convergence of a								
sequence and series of functions								
continuity, differentiation and								
Integration								
7- Understand the proof and	•						•	
applications of three famous								
theorems, Weierstrass								
approximation theorem, Picard's								
existence theorem, and the Arzela								
theorem on equicontinuous								
families of functions.								



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21. Topic Outline and Schedule:

Wee k	Lectur e	Торіс	Student Learnin g Outcom e	Learning Methods (Face to Face/Blen ded/ Fully Online)	Platfor m	Synchron ous / Asynchro nous Lecturing	Evaluation Methods	Resour ces
	1.1	Revision		Face to Face				Real Analysis Lecture Notes
1	1.2	Liminf and limsup of sequences of real numbers,		Face to Face				Textbo ok/Lectu re notes
	1.3	Basic properties of liminf and limsup. 2		Face to Face				Textboo k/Lectur e notes
	2.1	Cesaro Summability.		Face to Face				Textboo k/Lectur e notes
2	2.2	Series of real numbers, the definition and the algebraic properties		Face to Face				Textboo k/Lectur e notes
	2.3	Convergence, the definition and the basic properties. 2		Face to Face				Textboo k/Lectur e notes
Wee k	Lectur e	Торіс	Student Learnin g Outcom e	Learning Methods (Face to Face/Blen ded/ Fully Online)	Platfor m	Synchron ous / Asynchro nous Lecturing	Evaluation Methods	Resour ces
	3.1	Absolute and conditional convergence. 3		Face to Face				Textboo k/Lectur e notes
3	3.2	Tests of absolute convergence (the general form: using		Face to Face				Textboo k/Lectur e notes



		liminf, and limsup.) (Ratio, nth root and comparison tests).			
	3.3	Tests of absolute convergence	Face to Face		Textboo k/Lectur e notes
	4.1	Tests of absolute convergence	Face to Face		Textbo ok/Lectu re notes
4	4.2	Rearrangemen ts of series. 4	Face to Face		Textbo ok/Lectu re notes
	4.3	Abel test.	Face to Face		Textboo k/Lectur e notes
	5.1	Dirichlet test	Face to Face		Textboo k/Lectur e notes
5	5.2	Infinite product and its relation to infinite series.	Face to Face		Textboo k/Lectur e notes
	5.3	Sequences of functions, the definition and examples	Face to Face		Textboo k/Lectur e notes
	6.1	Pointwise convergence.	Face to Face		Textboo k/Lectur e notes
6	6.2	Uniform convergence.	Face to Face		Textbo ok/Lectu re notes
	6.3	Uniform convergence and continuity on [a,b.]	Face to Face		Textbo ok/Lectu re notes
7	7.1	Uniform convergence and integrability on [a,b.].	Face to Face		Textboo k/Lectur e notes
	7.2	Uniform convergence of sequences of	Face to Face		Textboo k/Lectur e notes

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		derivatives.						
	7.3	Midterm Exam		On Campus				
	8.1	Dini's Theorem.		Face to Face				Textbo ok/Lectu re notes
8	8.2	Uniform convergence and interchange limit theorems		Face to Face				Textboo k/Lectur e notes
	8.3	Series of functions, the definition and basic properties		Face to Face				Textbo ok/Lectu re notes
	9.1	Pointwise convergence of series of functions.		Face to Face				Textboo k/Lectur e notes
9	9.2	Uniformly convergence		Face to Face				Textboo k/Lectur e notes
	9.3	Weierstrass M- test.		Face to Face				Textbo ok/Lectu re notes
	10.1	Uniformly convergent series of continuous functions		Face to Face				Textbo ok/Lectu re notes
10	10.2	Uniformly convergent series of integrable functions		Face to Face				Textboo k/Lectur e notes
	10.3	More Examples		Face to Face				Textbo ok/Lectu re notes
``	Lecture	Topic	Student Learning Outcom e	Learning Methods (Face to Face/Blen ded/ Fully Online)	Platform	Synchrono us / Asynchron ous Lecturing	Evaluation Methods	Resourc es



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	function, Beta function, Laplace transform)			
15.2	Examples of functions represented by improper integral. (Gamma function, Beta function, Laplace transform)	Face to Face		Textbo ok/Lectu re notes
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22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:						
Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform	
Midterm	30	Sequence and Series of real numbers			On Campus	
Second Exam	20	Infinite product of real numbers and sequence of functions			On Campus	
Final Exam	50				On Campus	

23 Course Requirements

No requirements.

24 Course Policies:

A- Attendance policies: Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
B- Absences from exams and submitting assignments on time: All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor. Students must attend all the exams, students with acceptable excuse will have an average of the other exams. Medical certificates shall be given to the University Physician to be authorized by him.
C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior: Cheating is prohibited. The University of



Jordan regulations on cheating will be applied to any student who cheats in exams or on homework.

E- Grading policy:Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.

F- Available university services that support achievement in the course: We will use the E-learning platform to upload lecture notes and other useful material.

25 References:

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

- 1- Methods of real analysis, Richard R. Goldberg, John Wiley and sons, New York, 1984.
- B- Recommended books, materials, and media:
- 1- Principles of mathematical analysis W. Rudin.
- 2- Mathematical analysis, Apostol.

26 Additional information:

Name of Course Coordinator: Dr. Eman Aldabbas S Date: Nov. 2, 2022	Signature:
Head of Curriculum Committee/Department: Prof. Ahmad	Al Zghoul Signature:
Head of Department: -Prof. Manal Ghanem - Signature: -N Head of Curriculum Committee/Faculty:	И. Ghanem Signature:

9