جامعـة الـزيتونـة الأردنيـة
Al−Zaytoonah University of Jordan
كلية العلوم وتكنولوجيا المعلومات
Faculty of Science and Information Technology

" عراقة وجودة"
"Tradition and Quality"

Detailed Course Description - Course Plan Development and Updating Procedures/ ……………………. Department	QF01/0408-3.0E

Faculty	**Science**	Department	**Mathematics**
Course number	**0101453**	Course title	**Real Analysis 2**
Number of credit hours	**3**	Pre-requisite/co-requisite	**Real Analysis 1** **0101251**

Brief course description
1. Derivatives
2. Functions of Bounded Variation
3. Riemann Integral
4. Riemann-Stieltjes Integral
5. Sequences and Series of Functions

	Course goals and learning outcomes
Goal 1	know, understand and apply the definitions and theorems in the following topics: a- derivatives b- functions of bounded variation c- Riemann integral and Riemann-Stieltjes Integrals d- sequences and series of functions
Learning outcomes	1.1 Students will be able to prove the derivatives rules. 1.2 Students will be able to apply the derivatives rules. 1.3 Students will be able to understand the difference between Riemann integral and Riemann-Stieltjes Integrals
Goal 2	Compute a- the total variation of a function on a closed interval [a,b] b- Riemann-Stieltjes Integrals.
Learning outcomes	2.1 Students will be able to calculate a total variation of a function. 2.2 Students will be able to use a total variation of a function. 2.3 Students will be able to calculate a Riemann-Stieltjes Integrals.
Goal 3	Test point-wise and uniform convergence of sequences and series of functions.
Learning outcomes	3.1 Students will be able to understand the difference between the convergence at a point and uniform convergence. 3.2 Students will be able to study the uniform convergence of the sequences and series of functions. 3.3
Goal 4	
Learning outcomes	4.1 4.2 4.3

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Textbook	**1.** 1.- "Mathematical Analysis". By:T. Apostol Addison-Wesley Publishing Company, Second Edition (1974). **2.** 2.- Introduction To Real Analysis". By: R. Bartle and D. Sherbert John Wiley & Sons, Third Edition (2000).
Supplementary references	1) 1.- Introduction to Mathematical Analysis". By: S. Douglass Pearson, 3rd Edition (1996). 1) 2.- "The Elements of Real Analysis". By: R. Bartle John Wiley & Sons, 2nd Edition (1975). 1) 3.- "Principals of Mathematical Analysis. By: W. Rudin McGraw Hill, 3rd Edition (1976)

Course timeline				
Week	**Number of hours**	**Course topics**	**Pages (textbook)**	**Notes**
01	1 1 1	Definition of the Derivative, Derivative and Continuity Algebra of Derivatives, The Chain Rule One-Sided Derivatives and Infinite Derivatives	104-108	Text 1
02	1 1 1	Functions with Nonzero Derivative, Zero Derivatives and Local Extrema, Rolle's Theorem, The Mean-Value Theorem Genralized Mean-Value Theorem	108-111	Text 1
03	1 1 1	Intermediate-Value Theorem Taylor's Formula Properties of Monotonic Functions	111-114 127-128	Text 1
04	1 1 1	Functions of Bounded Variation. Total Variation.	128-130	Text 1
05	1 1 1	Additive Property of Total Variation. Total Variation on [a,x] as a Function of x. Functions of Bounded Variation Expressed as the Difference of Increasing Functions.	130-132	Text 1
06	1 1 1	Continuous Functions of Bounded Variation Definition of The Riemann Integral **First Exam 20%**	132-133 194-199	Text 1 Text 2
07	1 1 1	Some Properties of the Riemann Integral. Riemann Integrable Functions. The Fundamental Theorem of Calculus.	199-203 210-213	Text 2

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08	1 1 1	Definition of the Riemann-Stieltjes Integral, Linear Properties, Integration by Parts Change of Variables in a Riemann-Stieltjes Integral.	140-145	Text 1
09	1 1 1	Reduction to a Riemann-Stieltjes Integral Step Functions As Integrators Reduction to a Riemann-Stieltjes Integral to a Finite Sum	145-149	Text 1
10	1 1 1	Euler's Summation Formula Upper and Lower Integrals Additive and Linearity Properties of Upper and Lower integrals, Riemann's Condition	145-154	Text 1
11	1 1 1	Comparison Theorems Integrators of Bounded Variation Sufficient and Necessary Conditions for Existence of Riemann-Stieltjes Integrals.	155-160	Text 1
12	1 1 1	**Second Exam 20%** The First and Second Mean-Value Theorems for Riemann-Stieltjes Integrals. The Integral as a Function of the Interval.	160-162	Text 1
13	1 1 1	Pointwise Convergence of Sequences of Functions. Uniform Convergence and Continuity. The Cauchy Condition for Uniform Convergence.	218-223	Text 1
14	1 1 1	Uniform Convergence of Infinite Series of Functions Uniform Convergence and Differentiation Sufficient Condition for Uniform Convergence of a Series	223-224 228-231	Text 1
15	1 1 1	Real Power Series. Multiplication of Power series. The Taylor's Series.	240-242	Text 1
16	1 1 1	**Final Exam (50%)**		

Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department		Date of approval	
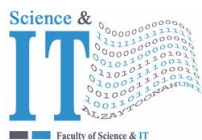
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Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	d. Abdulkarim Farah	Office Number	**127**
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Office hours			