Republic of Iraq
The Ministry of Higher Education & Scientific Research
2024-2023

University: Thi-Qar
College: Education for Pure Science
Department: Mathematics
Stage: 2nd
Lecturer name: Dr. Lamees Kadhim
Qualification: Doctoral digree
Academic Statuse: Assis. Prof.

Course Instructor	Dr.Lamees Kadhim Ali Alzaki				
E_mail	lkalzaki@utq.edu.iq				
Title	Advanced Calculus				
Course Coordinator	Dr. Lamees Alzaki				
Course Objective	1. To provide the student with the skills of calculus operations which are needed for further study in mathematics. 2. To provide the student with the skills necessary to be able to give reasonable explanations. 3. To provide the student with the critical thinking skills required to solve problems in mathematics.				
Course Description	This course is sequel to Calculus III and serves as an introduction to topics in Advanced Calculus. Specifically, we consider line, surface and volume integrals in two- and three-dimensional space. Advanced topics of calculus include a review of infinite sequences and infinite series, Partial differentiation, multiple integral, Areas and volumes, surface integrals, theorems of Green, Stokes' divergence theorem, and polar system.				
Textbook	• Calculus And Analytic Geometry by Thomas & Finney • Calculus And Analytic Geometry by Purcell & Varberg • Schaum's Outline of Calculus, 5th ed. (Schaum's Outline Series)				
Course Assessment	Term Tests	Laboratory	Quizzes	Project	Final Exam
	1st term 2nd term	20 20	10	-	50
General Notes	1. With the summary indicate that: • The student's understanding of Mathematics (from the course) • The student's ability to learn mathematics. • The student's ability to apply mathematics to the real-world. 2. Instructor created exams, quizzes and homework.				

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Course weekly Outline

week	Date		Lab. Experiment Assignments	Notes
1	17/9/2023	Sequences of Scalars and Convergence Criteria		Definition, Properties, Types of sequences
2	24/9/2023	Infinite sequences		Convergence by definition, Examples
3	01/10/2023	Infinite Series		Definition, Properties
4	08/10/2023	Partial sums sequence		Theorem, examples
5	15/10/2023	Series of Scalars and Convergence Criteria		Geometric series, positive term series, Harmonic series
6	22/10/2023	Tests for Convergence of Infinite Series		Integral test, divergence test, Basic and Limit test, Root and Ratio test
7	29/10/2023	Alternating series		Absolute and conditionally convergence
8	05/11/2023	Power Series and the Radius of Convergence		Interval of convergence
9	12/11/2023	Represents the functions by a power series		Properties, theorem, examples
10	19/11/2023	Maclaurin and Taylor Series given by Definition and from Existing Series		The derivative of Mac. and Taylor series, examples
11	26/11/2023	Partial Differentiation		Definition
12	03/12/2023	Chain Rules in Partial Differentiation		Theorems and examples
13	10/12/2023	Multiple Integrals		Properties of integral
14	17/12/2023	Double Integrals		Changing the order of integration
15	24/1/2023	Exams		
16	31/1/2023	Exams		

Half-year Break

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17	28/1/2024	Areas		Change of Variables and Jacobians
18	04/2/2024	Volumes		Examples
19	11/2/2024	Triple Integrals		The volumes splitting the integral
20	18/2/2024	Line Integral		Examples
21	25/2/2024	Green's theorem		Statement and examples
22	03/3/2024	Surface Area		examples
23	10/3/2024	Surface Integrals		examples
24	17/3/2024	The Divergence Theorem		Statement and examples
25	24/3/2024	Stokes Theorem		Statement and examples
26	31/3/2024	Polar coordinates system		The relation between Cartesian and polar systems
27	07/4/2024	Graphs in polar coordinates		Cardioid, Limacon, circle, Rose curve, spiral
28	14/4/2024	Conic sections in the polar system		Examples
29	21/4/2024	Area in the polar coordinates		Area inside curves, Surface area
30	28/4/2024	Length of curves		Asymptotic line in the polar system
31	05/5/2024	Conic sections		Circle, parabola, ellipse
32	12/6/2024	Exams		

تؤيد اللجنة العلمية مطابقة الخطة التدريسية لمفردات منهج المادة الدراسية

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Instructor Signature (Lab.) **Instructor Signature (Theoretical)**

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1st Scientific committee member **2nd Scientific committee member** **3rd Scientific committee member**

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Head of Scientific committee **Dean**

ملاحظة: أعدت الاستمارة أستنادا الى كتاب وزارة التعليم العالي والبحث العلمي، جهاز الاشراف والتقويم العلمي، دائرة ضمان الجودة والاعتماد الاكاديمي، قسم تقويم الاداء ..... ج د ت / 1860 في تاريخ 02/ 10/ 2014