KOMAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
(KUST)

Advanced Calculus			
Course Title:	Advanced Calculus / Calculus III		
Course Code:	MTH2412	**No. of Credits:**	4
Department:	All Engineering Departments	**College:**	Engineering
Pre-requisites Course Code:	MTH1411	**Co-requisites Course Code:**	
Course Coordinator(s):	Ghafour Ahani		
Email:	**Ghafour.Ahani@komar.edu.iq**	**IP No:**	
Other Course Teacher(s)/Tutor(s):	None		
Class Hours:	Section#1: M, W, 10:00 - 11:50, Room G-13-14 Section#2: T, R, 08:00 - 09:50, Room 106		
Contact Hours:	Wednesdays, 10:00-11:00		
Course Type:	☐ University course ☑ College course ☐ Department course ☐ Elective		
Offer in Academic Year:	Spring 2016		

COURSE DESCRIPTION

In this course, we'll study multivariable calculus. Many functions are depend on more than one independent variable. For example, the volume of a right circular cylinder is a function of its radius and its height, so it is a function V(r, h) of two variables r and h. We extend the basic ideas of single variable calculus to functions of several variables. Their limits and derivatives are more varied and interesting because of the different ways the variables can interact. The applications of these derivatives are also more varied than for single-variable calculus, and after that we will see that the same is true for integrals involving several variables.

COURSE OBJECTIVES

- Apply calculus in real-world situations
- Work with three-dimensional coordinate systems and vectors.
- Work with calculus of vector-valued functions, describe the paths and motions of objects moving in a plane or in space
- Describe and explain the application of multivariable functions and be able to perform the calculus operations on them
- Illustrate several applications of multiple integrals, including calculations of volumes, areas in the plane and etc.
- Use theory of integration on curves and surfaces in space.

COURSE LEARNING OUTCOMES

After participating in the course, students would be able to:

1. Perform basic operations on vectors, find the dot and cross products, draw cylinders and quadric surfaces in three-dimensional coordinate systems
2. Perform calculus operations on vector-valued functions; including drawing graphs, limits, derivatives, and integrals.
3. Find domain, limit, partial derivatives, directional derivatives, extreme values, saddle points of multivariable functions & determine whether a multivariable function is continuous or not.
4. Evaluate double integrals on rectangle and polar coordinate systems, find areas using double integral and evaluate and interpret triple integrals on three-dimensional coordinate systems.
5. Evaluate line integrals and use it in finding flux, circulation..

GUIDELINES ON GRADING POLICY

Points	Percentage Scores	Grade
A	95–100	4.0
A-	90-94	3.7
B+	87–89	3.3
B	83-86	3.0
B-	80-82	2.7
C+	75–79	2.3
C	70-74	2.0
C-	65-69	1.7
D+	60–64	1.3
D	55-59	1.0
D-	50-54	0.7
F	0–49	0
I	Incomplete Course Work	
W	Official Withdrawal	

Passing Grade is 65%

COURSE CONTENT

Course topics include:

1. Vectors and the geometry of space
2. Vector-valued functions and motion in space
3. Partial derivatives
4. Multiple integrals
5. Integration in vector fields

COURSE TEACHING AND LEARNING ACTIVITIES

Course Teaching and Learning Activities:

Lectures: During a week, the lectures will be held twice throughout the semester.

Homework: Students must work on the homework at home. Grade of homework will compute based on the grade will achieved in quizzes and tests.

Quizzes: All quizzes are closed book, and calculators are not allowed.

Test: Tests will be closed book. Calculators and laptops are not allowed.

Final Exam: The final exam will be comprehensive and closed book; it will cover the entire course material.

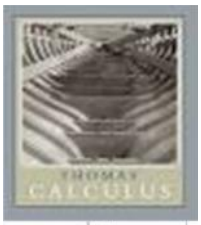
COURSE ASSESSMENT Tools

Assessment Tool	Weight
Homework (6)	5 %
Participation	5 %
Quizzes (4)	15 %
Test#1	12.5 %
Midterm Exam	17.5 %
Test#2	15%
Final Exam	30 %

ESSENTIAL READINGS: (Journals, textbooks, website addresses etc.)

Textbook:

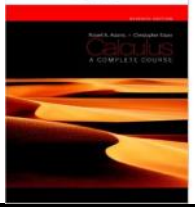
Thomas' Calculus,
by George B. Thomas, Jr & et al,
Pearson 2005, 11th Edition,
ISB 0-321-24335-8.



References:

1. Calculus by James Stewart,
Cengage Learning 2012, 7th Edition,
ISBN-13: 978-0-538-49781-7,
ISBN-10: 0-538-49781-5.

2. Calculus, a complete course
by Robert A. Adams & Christopher Essex,
Pearson 7th edition,
ISBN 978-0-321-54928-0



COURSE POLICY (including plagiarism, academic honesty, attendance etc)

- KUST Academic Policy
  http://sar.komar.edu.iq/files/Student%20hand%20Book%202013.pdf
- Come to class on time.
- Be attentive and engaged in class.
- Refrain from using laptops, cell phones and other electronic devices during class.
- Not permitted to eat or drink in class
- Spend an adequate amount of time on the homework each week, making an effort to solve and understand each problem.
- Homework should be handed over in the next session.
- Engage with both the abstract and computational sides of the material.
- Calculator is not allowed in the exams(quiz, test, midterm, final exam)
- KUST guidelines for lateness are as follows: Three occasions of lateness count as one absence. (You can be considered late the first minute of the lecture time).

GUIDELINES FOR SUCCESS

- Try to explain what you have learned to your classmates and share your knowledge with them
- Try to understand not memorizing
- ask your question in the class
- feel free to come to my office and we work on your problems

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Course calendar: Please check the academic calendar for spring 2016

Week	Beg/End Dates	Topics (Chapters)	Assessment Tools
1	28 Feb - 3 March	Introduction & Syllabus Description 12.1 Three-Dimensional Coordinate Systems	
2	6 March - 10 March	12.2 Vectors 12.3 The Dot Product 12.4 The Cross Product	HW#1
3	13 March - 17 March	12.5 Lines and Planes in Space 12.6 Cylinders and Quadric Surfaces	Quiz#1
	20 March – 24 March	**Nawrouz Holiday**	
4	27 March - 31 March	12.6 Cylinders and Quadric Surfaces 13.1 Curves in Space and Their Tangents 13.2 Integrals of Vector Functions; Projectile Motion	HW#2
5	3 April - 7April	13.3 Arc Length in Space 14.1 Functions of Several Variables	Quiz#2
6	10 April - 14 April	14.2 Limits and Continuity in Higher Dimensions 14.3 Partial Derivatives	Test#1 HW#3
7	17 April – 21 April	14.4 The Chain Rule 14.5 Directional Derivatives and Gradient Vectors 14.6 Tangent Planes and Differentials	
	22 April – 28 April	**Midterm Exam**	
8	2 May – 5 May	14.7 Extreme Values and Saddle Points 14.8 Lagrange Multipliers	HW#4
9	8 May – 12 May	15.1 Double and Iterated Integrals over Rectangles 15.2 Double Integrals over General Regions	Quiz#3
10	15 May – 19 May	15.3 Area by Double Integration 15.4 Double Integrals in Polar Form	HW#5
11	22 May – 26 May	15.5 Triple Integrals in Rectangular Coordinates	Test#2
12	29 May – 2 June	15.7 Triple Integrals in Cylindrical Coordinates 16.1 Line Integrals	HW#6
13	5 June – 9 June	16.1 Line Integrals 16.2 Vector Fields and Line Integrals: Work, Circulation, and Flux	Quiz#4
14	12 June – 16 June	16.3 Path Independence, Conservative Fields, and Potential Functions 16.4 Green's Theorem in the Plane	
15	19 June – 23 June	**Review Week**	
16	**24 June – 30 June**	**Final Exam**	