اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Calculus in Several Variables
Course Code:	MTH 203
Program:	BS-Mathematics
Department:	Mathematics
College:	College of Sciences, AlZulfi
Institution:	Majmaah University, Saudi Arabia

Table of Contents

A. Course Identification

1. Credit hours: 4(3+1)	

2. Course type

a. University ☐ College ☐ Department ☑ Others ☐

b. Required ☑ Elective ☐

3. Level/year at which this course is offered: 1st Semester /2st year

4. Pre-requisites for this course (if any)**: MTH 102**

5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	75%
2	Blended	0	0%
3	E-learning	0	0%
4	Distance learning	0	0%
5	Other	15	25%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	15
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers the generalization of the concepts of calculus in single-variable functions to a function of several variables the topics to will be covered are:
Functions of two or more variables-. Limits- Continuity, partial derivatives- Higher order partial derivatives, chain rule Maximum and Minimum values and their applications, Double integrals in Cartesian and Polar coordinates. Double integrals in Cartesian and Polar coordinates. Triple integrals in cylindrical and spherical coordinates.

2. Course Main Objective

This course aims to generalize the concepts of functions with single variable to functions with multiple variables and identify different applications such as Domain of definitions graphing functions in two and three dimensions, limits, continuity, differentiation and multi-integrations and their applications in finding the volumes of very complicated shapes.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Identify the functions in more than one variable and their properties. Generalize some applications such as: Limits, Continuity. Knowing how to obtain partial derivatives, the properties of double and triple integration in different coordinates	K1
1.2		
1.3		
1...		
2	**Skills :**	
2.1	The students will be able to write physical problems in mathematical forms	S1
2.2		
2.3		
2...		
3	**Competence:**	
3.1	The students should be able to formulate and solve mathematical problems such as: finding the maximum and minimum values to real life problems and finding the volume in integration forms.	C2
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Functions of several variables and thier properties	12
2	Limits and continuity of functions in several variables	10
3	Partial derivatives, Total derivatives, Chain rule Maximum and Minimum Values	12
4	Double integrals in Cartesian and Polar coordinates.	10
5	Triple integrals in cylindrical and spherical coordinates.	8
6	Cartesian, cylindrical and spherical coordinates.	8
	Total	**60**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Identify the functions in more than one variable and their properties.	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
1.2	Generalize some applications such as: Limits, Continuity.	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
1.3	Knowledge of partial derivatives, the properties of double and triple integration in different coordinates	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.0	**Skills**		
2.1	**Graphing functions in two veriables**	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.2	**Understand** the polar coordinates	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.3	**Understanding** how to transfer from Cartesian to cylindrical and spherical coordinates	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
3.0	**Values**		
3.1	**Ability** to work in a team to understand the problem	• Group discussion	• Exercise • Electronic MCQ Test
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4th Week	2.5%
2	Assignment/Home Work 1	5th Week	2.5%
3	Mid Term 1	7th Week	20%
4	Quiz 2	9th Week	2.5%
5	Assignment /Home Work 2	10th Week	2.5%
6	Class Activities/Discussions	10th Week	5%
7	Mid Term 2	12th Week	20%
8	Electronic Test	13th Week	5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
9	Final Exam	15th Week	40%
	Total		100%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Department of mathematics has "**Student Academic Advisory Committee**". This committee is responsible for students counseling and advising works in synchronization and collaboration with the Deanship of Admissions and Registration and Student Affairs. Department of mathematics Alzulfi has a continuous and standardized procedure that be associated with the student's progress until completion of degree and includes psychological, social and behavioral guidance. This advisory committee also maintain the student's files. The students with GPA below than 50 % in Mid 1 and Mid 2 are stayed under serious observation and continuous consultations with respective course instructor about their performing. The course teacher will commit to a minimum scheduled time for student consultation equivalent to **2 HOURS PER WEEK**

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	James Stewart: Multivariable Calculcs. Seventh Edition, Brooks Cole, 2011.
Essential References Materials	1. Salas, Hille, and Etgen: Calculus of one and several variables. Ninth Edition, John Wiley&Sons, 2003. 2. James Stewart: Multivariable Calculcs. Seventh Edition, Brooks Cole, 2011.
Electronic Materials	http://mathworld.wolfram.com/classroom/classes/CalculusII.html **www.stewartcalculus.com**
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of students do not exceed on 30 in the classroom

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	- Mathematics Lab is equipped with a computer. - Provide overhead projectors and related items i.e smart Board, Wi-Fi, AV. - Updated Math Software i. e Mathematica, Matlab, Maple. etc
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Extent of achievement of course learning outcomes	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources.	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Mathematics Department
Reference No.	27
Date	8/8/1442 H -21/3/2021 G

Head of Department

Dr. Muqrin Almuqrin