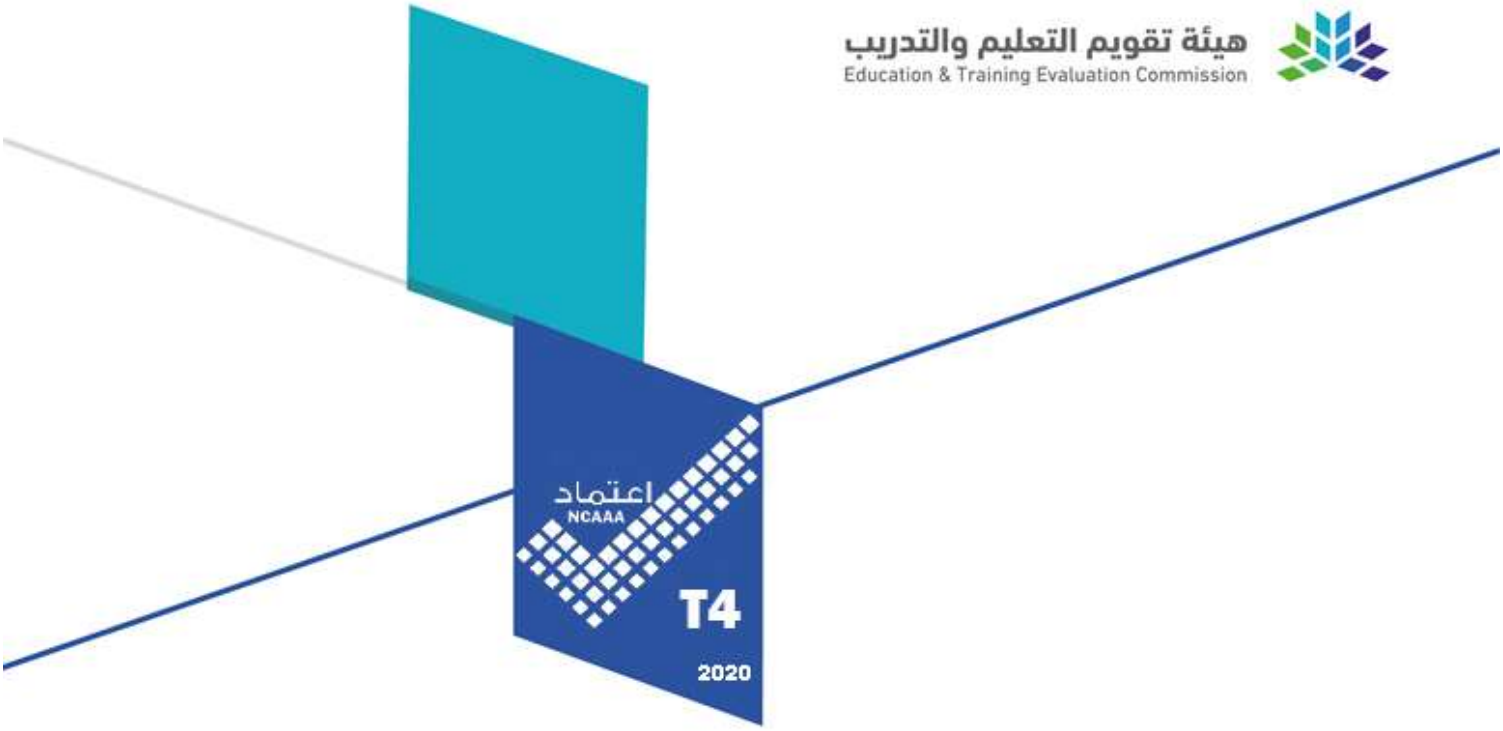
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Advanced Calculus
Course Code:	Math 203
Program:	Bachelor of Science in Mathematics
Department:	Mathematics
College:	Science
Institution:	University of Tabuk

Table of Contents

A. Course Identification

1. Credit hours:	**04 Hours/Week**
2. Course type:	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	**L4/Y2**
4. Pre-requisites for this course (if any)**: Math 200**	
5. Co-requisites for this course (if any)**:** **None**	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom / Blackboard**	60	100 %
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

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

B. Course Objectives and Learning Outcomes

1. Course Description

The main purpose of this course is to present the fundamental concepts of multivariable calculus and to develop student understanding and skills in the topic necessary for its applications to science and engineering.

2. Course Main Objective

-Students will be able to recognize the geometry of three-dimensional Euclidian space.
-Students will be able to develop calculus concepts of vector-valued functions, motion (in the 3D space) and the notion of curvature.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding :**	
1.1	Students will be able to recall concepts and theorem of advanced calculus	K1
1.2	Students will be able demonstrate knowledge of methods used for solving advanced calculus problems.	K2
2	**Skills :**	
2.1	Students will be able to analyze problems involving Gradients and Directional Derivatives, Double Integral, Triple Integrals, Line integral.	S1
2.2	Students will be able to prove theorems of integral calculus.	S2
2.3	Students will be able to apply theories and concepts to solve problems of advanced calculus.	S3
3	**Values:**	
3.1	Students will be able to work efficiently as a part of a team.	V1
3.4	Students will be able to manage duties and time.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Cylindrical Coordinates, Spherical Coordinates, Introduction to Partial Derivatives	4
2	Limits and Continuity , The Chain Rule ,Derivative Matrix, The General Chain Rule	4
3	Gradients and Directional Derivatives ,Tangent Plane to a Surface	4
4	Maxima and Minima, Method of Lagrange Multipliers	4
5	Review Exercises	4
6	The Double Integral and Iterated Integral, The Double Integral over General Regions	4
6	**Mid-Exam#1**	
7	Triple Integrals, Integrals in Polar, Cylindrical and Spherical Coordinates	4
8	Integrals in Polar, Cylindrical and Spherical Coordinates	4
9	Line Integrals, Path Independence	4
10	Green's Theorem	4
11	Review Exercises	4
6	**Mid-Exam#2**	
12	Circulation and Stokes's Theorem	4
13	Flux and Divergence	4
14	Green's Theorem	4
15	**Review for Final Exam**	4
Total		**60 Hrs**

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	Students will be able to recall concepts and theorem of advanced calculus	Introducing new ideas through case study	Quizzes I II Midterm Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Students will be able demonstrate knowledge of methods used for solving advanced calculus problems.	Lectures Class Discussions	Final Exams homework assignments.
2.0	**Skills**		
2.1	Students will be able to analyze problems involving Gradients and Directional Derivatives, Double Integral, Triple Integrals, Line integral.	-Lectures -Class Discussions	-Quizzes -I II Midterm Exams -Final Exams -Homework assignments.
2.2	Students will be able to prove theorems of integral calculus.		
2.3	Students will be able to apply theories and concepts to solve problems of advanced calculus.		
3.0	**Values**		
3.1	Students will be able to work efficiently as a part of a team	-Lectures -Assign tasks	-Quizzes -Homework assignments.
3.2	Students will be able to manage duties and time.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Activities	Weekly basis	5%
2	Homework	Weekly basis	5%
3	Quizzes	Weekly basis	10%
4	Mid Exam1	6^{th} week	20%
5	Mid Exam2	11^{th} week	20%
6	Final Exam	At end of the Semester	40%

***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 :
Six office hours per week in the lecturer schedule.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Calculus 3rd., Jerrold Marsden and Alan Weinstein, 1985.
Essential References Materials	Courant, Richard, and Fritz John. Introduction to calculus and analysis I. Springer Science & Business Media, 2012
Electronic Materials	None

Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Lecture Room with maximum capacity of 30 students and equipped with White Board, Overhead projector and internet connection. - Library
Technology Resources (AV, data show, Smart Board, software, etc.)	Projectors
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Direct and Indirect
Extent of achievement of course learning outcomes	Teachers	Direct
Quality of learning resources	Students	Indirect

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	Study plan and curriculum committee
Reference No.	
Date	25/08/2021