هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**Advanced Calculus**
Course Code:	**213Math-3**
Program:	**B.Sc. of Mathematics**
Department:	**Mathematics**
College:	**Art and Sciences**
Institution:	**Najran University**
Version:	**1**
Last Revision Date:	**07-05-2023**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	**3**				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	**3/2**				
4. Course general Description This course will cover partial derivatives, multiple integrals, and applications.					
5. Pre-requirements for this course (if any): **(Integration Calculus) 112Math 3**					
6. Co- requirements for this course (if any): **N/A**					
7. Course Main Objective(s) The main objective of the course is to familiarize the students with the essential concepts and the solutions of partial derivatives and multiple integrals.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	**3**	**100%**
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	**45**
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define the basic concepts about partial derivatives	K1	Lecture Cooperative learning Problem solving Brain storming Self-Learning	Assignments Midterm Final Exam
1.2	Describe appropriate information for applying partial Derivatives and Multiple integral in various scientific fields.			
2.0	Skills			
2.1	Evaluate the partial derivative of multivariable functions and multiple integral.	S1	Lecture Cooperative learning Problem solving Brain storming Self-Learning	Assignments Midterm Final Exam
2.2	Apply multivariate calculus techniques to calculate the gradients, directional derivatives, arc length of curves, area of surfaces, and volume of solids.	S4		
3.0	Values, autonomy, and responsibility			
3.1	Work effectively in a group.	V1	Assign each group of students to do assignments and explain it to their classmates	Observation Card Oral Test

C. Course Content

No	List of Topics	Contact Hours
1.	Functions of Several Variables, Limits and Continuity, Partial	12

	Derivatives, Increments and Differentials, Chain Rules	
2.	Directional Derivatives, Tangent Planes and Normal Lines, Extrema of Functions of Several Variables, Lagrange Multipliers	10
3.	Double Integrals, Area and Volume, Double Integrals in Polar Coordinates, Surface Area.	9
4.	Triple Integrals, Moments and Center of Mass	8
5.	Integrals in Cylindrical Coordinates, Spherical Coordinates, Change of Variables	6
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	6-8 11-12	20 20
2.	Assignments & Quizzes	During classes	10
3.	Final Exam	16-18	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	رمضان جهيمة و احمد عبدالعالي هب الريح، التفاضل والتكامل الجزء الثاني ، 2002، الطبعة الثالثة، دار الكتاب الجديد المتحدة
Supportive References	- George Thomas, Joel Hass, Maurice D. Weir, Thomas' Calculus, 2014, 13th edition, Pearson Education. - Howard Anton, Calculus, 2009, 9th edition, JOHN WILEY & SONS, INC. - Salas, Calculus: One and Several Variables, 2007, 10th edition, JOHN WILEY & SONS, INC.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Classroom with 30 seats.
Technology equipment (projector, smart board, software)	- Blackboard Platform - Mathematica Program - Projector
Other equipment (depending on the nature of the specialty)	**N/A**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Student Questionnaire (Indirect)
Effectiveness of students assessment	Peer Reviewer	Rubrics (Indirect)
Quality of learning resources		
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Council of Mathematics Department
REFERENCE NO.	14441017-0208-00014
DATE	17-10-1444H