Course Specification
(Bachelor)

Course Title:	Advanced Calculus
Course Code:	286Math-3
Program:	B.Sc. of Computer Science + Information Systems
Department:	Computer Science and Information Systems
College:	Computer Science and Information Systems
Institution:	Najran University
Version:	2
Last Revision Date:	17-05-2025

Table of Contents

A. General information about the course:

1. 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: (7/4)					
4. Course General Description:					
This Course will cover the sequences and infinity Series, calculus with multivariate functions and Applications.					
5. Pre-requirements for this course (if any):					
Introduction to Integral (282Math-3)					
6. Co-requisites for this course (if any):					
none					
7. Course Main Objective(s):					
The main objectives of the course is to determine when a sequences and series converge, understand the relation between the function and its representation by power series by Maclaurin and Taylor series, and familiarize the students with the essential concepts and the solutions of partial derivatives and multiple integrals.					

2. 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		

3. 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 PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the basic concepts about Convergence of infinite Series ,partial Derivatives		Lecture Cooperative learning Problem solving Brainstorming	Assignments Quiz Midterm Exam Final Exam
1.2	Describe appropriate information for applying partial Derivatives and Multiple integral in various scientific fields.			
2.0	**Skills**			
2.1	Evaluate limits of sequences, know basic limits and determine the limits of some simple recursively defined sequences		Lecture Cooperative learning Problem solving Brainstorming	Assignments Quiz Midterm Exam Final Exam
2.2	Apply series tests to determine whether a particular series converges or diverges.			
2.3	Evaluate the partial derivative of multivariable functions and multiple integral.			
2.4	Apply multivariate calculus techniques to calculate the gradients, directional derivatives, arc length of curves, area of surfaces, and volume of solids.			
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.1	Work effectively with in groups and independently			

C. Course Content

No	List of Topics	Contact Hours
1.	Infinite Series, Convergence Tests, Taylor and Maclorian Series	**9**
2.	Functions of Several Variables, Limits and Continuity, Partial Derivatives, Increments and Differentials, Chain Rules	**6**
3.	Directional Derivatives, Tangent Planes and Normal Lines, Extrema of Functions of Several Variables, Lagrange Multipliers	**9**
4.	Double Integrals, Area and Volume, Double Integrals in Polar Coordinates, Surface Area.	**9**
5.	Triple Integrals, Moments and Center of Mass	**6**
6.	Integrals in Cylindrical Coordinates, Spherical Coordinates, Change of Variables and Jacobians	**6**
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exams	6-8 11-13	20 20
2.	Assignments & Quizzes	During classes	10
3.	Final Exam	16-18	50
4.	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	- George Thomas, Joel Hass, Maurice D. Weir, Thomas' Calculus, 2014, 13th edition, Pearson Education.

Supportive References	- Howard Anton, Calculus, 2009, 9th edition, JOHN WILEY & SONS, INC. - Salas, Calculus: One and Several Variables, 2007, 10th edition, JOHN WILEY & SONS, INC. - E. Swokowski, "Calculus", the classical edition books, Cole Publisher, 1994.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

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		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	