هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Calculus 3**
Course Code:	2022202-4
Program:	Bachelor in Mathematics
Department:	Mathematics and Statistics Department
College:	**Faculty of Sciences**
Institution:	**Taif University**
Version:	1
Last Revision Date:	20/05/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 4(4,0,0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐ Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Level 4 / Second Year					
4. Course general Description:					
This course covers some topics in advanced calculus (real functions of several variables, limits, continuity, partial derivatives and differentials, Jacobian matrix, chain rule, directional derivatives, Gradients Tangent Planes and Normal Vectors, maximum and minimum of Functions of Two Variables, Lagrange multipliers). The course focus also on Double Integrals over Nonrectangular Regions- Double Integrals in Polar Coordinates, Triple Integrals- Triple Integrals in Cylindrical Coordinates and Spherical Coordinates, Change of Variables in Multiple Integrals, Jacobians, Line Integrals- Existence of Anti-derivative, Surface Area and Surface Integrals, Green's Theorem in Vector Form, Divergence Theorem and Stokes's Theorem.					
5. Pre-requirements for this course (if any)**:**					
Calculus II (2022104-4)					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					

- Recognize the Limits and Continuity of Functions of Two or More Variables.
- Identify the Limits and Continuity of Functions of Two or More Variables.
- Explain the limit, continuity, partial derivatives and the total differential for a function of several variables.
- Apply performance of different Evaluate double, triple integrals and surface integral.
- Demonstrate the derivative concepts to find tangent lines to level curves and to solve optimization problems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**4Hr /Week**	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**	60
2.	**Laboratory/Studio**	NA
3.	**Field**	NA
4.	**Tutorial**	NA
5.	**Others (specify)**	NA
Total		**60**

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	Recognize the Limits and Continuity of Functions of Two or More Variables.	K1	• Lectures • Group discussions	• Quizzes • Assignments
1.2	Identify the Limits and Continuity of Functions of Two or More Variables.	K1	• Lectures • Group discussions	• Exams • Assignments
2.0	**Skills**			
2.1	Explain the limit, continuity, partial derivatives and the total differential for a	S1	• Interactive classes • Group discussions	• Quizzes • Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	function of several variables.			
2.2	Apply performance of different Evaluate double, triple integrals and surface integral.	S1	• Lectures • Group discussions	• Exams • Quizzes
2.3	Demonstrate the derivative concepts to find tangent lines to level curves and to solve optimization problems.	S1	• Lectures • Self-learning through the website	• Exams • Quizzes • Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	Show the responsibility for their own learning and continuing personal and professional development.	V2	• projects	• Oral exams

C. Course Content

No	List of Topics	Contact Hours
1.	Functions of Several Variables	
2.	Limits- Continuity of Functions of two Variables	4
3.	Partial Derivatives-Differentials of Functions of Several Variables	4
4.	The Chain Rule- Tangent Planes	4
5.	Directional Derivatives- Local Maxima and Minima of Functions of Two Variables	4
6.	Absolute Maxima and Minima of Functions of Two Variables- Lagrange Multipliers of Functions of Several Variables	4
7.	**First Midterm exam**	4
8.	Double Integrals and double Integrals over Nonrectangular Regions	4
9.	Double Integrals in Polar Coordinates-Triple Integrals	4
10.	Triple Integrals in Cylindrical Coordinates- Spherical Coordinates-Triple Integrals in Spherical Coordinates.	4
11.	Change of Variables in Multiple Integrals- Jacobians-Line Integrals-Existence of anti-derivative.)	4
12	Surface area and surface integrals.	4
13.	**Second Midterm exam**	4
14.	Green's Theorem in Vector Form	4
15	Stokes's Theorem and Divergence Theorem	4
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Continuous Evaluation	10 %
2.	Assignments, report	Continuous Evaluation	10 %
3.	Midterm 1 Exam	8-9	15%
4.	Midterm 2 Exam	12-13	15%
5.	Final Exam	15-16	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	H. Anton, I. Bivens and S. Davis, (2010), Calculus: Early Transcendentals, International Student Version, 10th Edition, USA, John Wiley & Sons, Inc
Supportive References	J. Stewart, (2012), Calculus: Early Transcendentals,7th edition, USA, Brooks/Cole
Electronic Materials	Lectures available in Blackboard
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Data show, Blackboard
Other equipment (Depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leader	Direct & Indirect
Effectiveness of students assessment	Faculty, Program Leader	Direct

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct & Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	4
DATE	October 2023

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