Course Specification
— (Bachelor)

Course Title: **Calculus I**

Course Code: **2021204-4**

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: 3(3,2,0)

2. Course type

A.	☐University	☒ College	☐ Department	☐ Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: Level 2 / First Year

4. Course general Description:

This course covers some topics in in calculus (Trigonometric Functions and their Inverse- Hyperbolic Functions and their Inverse). The Concept of Limit- Computation of Limits, - Limits Involving Infinity-Asymptotes-Continuity. Tangent Lines and Rates of Change. This course focuses also on Introduction to Techniques of Differentiation, The Product and Quotient Rules- Derivatives of Exponential Functions- Derivatives of Logarithmic Functions Derivatives of Trigonometric Functions- Derivatives of Inverse Trigonometric Functions. Derivatives of Hyperbolic Functions, Derivatives of Inverse Hyperbolic Function- the Chain Rule, Parametric differentiation, Implicit Differentiation- Maximum and Minimum Values- Increasing and Decreasing Functions, Concavity and the Second Derivative Test, L'Hospital's Rule- Indeterminate Forms, Rolle's Theorem- Mean-Value Theorem, Maclurin's and Taylor's Theorem.

5. Pre-requirements for this course (if any):

Introduction to Mathematics (202112-3)

6. Co -requirements for this course (if any):

None

7. Course Main Objective(s):

- Identify the fundamental concepts and basic knowledge of calculus.
- Recognize the intuitive knowledge of limits and continuity of a function.
- Employ limit and continuity (graphically and analytically).
- Apply all types of functions by using the techniques of differentiation.
- Explain maximum, minimum, and related rates problems using differentiation.

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	Identify the fundamental concepts and basics knowledge of calculus.	K1	• Lectures • Group discussions `	• Quizzes • Assignments
1.2	Recognize the intuitive knowledge of limits and continuity of a function.	K1	• Lectures • Group discussions	• Exams • Assignments
2.0	**Skills**			
2.1	Employ limit and continuity (graphically and analytically).	S2	• Interactive classes • Group discussions	• Quizzes • Assignments
2.2	Apply all type of functions by using the techniques of differentiation.	S2	• Lectures • Group discussions	• Exams
2.3	Explain maximum,	S2	• Lectures	• Exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	minimum, and related rates problems using differentiation.		● Self-learning through the website	● 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	Through the oral presentation of the projects

C. Course Content

No	List of Topics	Contact Hours
1.	Trigonometric Functions and their Inverse Functions.	4
2.	Hyperbolic Functions and their Inverse.	4
3.	The Concept of Limit- Computation of Limits.	4
4.	Limits Involving Infinity.	4
5.	Asymptotes-Continuity- The tangent Lines and Rates of Change.	4
6.	Derivatives Rule- The Product and Quotient Rules- the Chain Rule.	4
7.	**First Midterm exam.**	4
8.	Derivatives of Exponential Functions- Derivatives of Logarithmic Functions.	4
9.	Derivatives of Trigonometric Functions - Derivatives of Inverse Trigonometric Functions.	4
10.	Derivatives of Hyperbolic Functions- Derivatives of Inverse Hyperbolic Function and parametric Differentiation-Implicit Differentiation.	4
11.	Applications of differentiation, Maximum and Minimum Values- Increasing and Decreasing Functions- Concavity and the Second Derivative.	4
12	L'Hospital's Rule- Indeterminate Forms	4
13.	**Second Midterm exam**	4
14.	Rolle's Theorem- Mean-Value Theorem.	4
15	Maclurin's and Taylor's 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

قسم الرياضيات والإحصاء
Mathematics and Statistics Department

جامعة الطائف
TAIF UNIVERSITY