اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	**Calculus I**
Course Code:	**2021204-4**
Program:	**Bachelor In Biotechnology**
Department:	**Department of Biotechnology**
College:	**Faculty of Sciences**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. **Credit hours:** 4 Hours	

2. Course type

a. University ☐ College ☑ Department ☐ Others ☐

b. Required ☑ Elective ☐

3. Level/year at which this course is offered: 3rd level, 1st year

4. Pre-requisites for this course (if any):
Introduction to Mathematics (202112-3)

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**	**60**	**100%**
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	**60**
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	**60**
Other Learning Hours*		
1	Study	**45**
2	Assignments	**20**
3	Library	**5**
4	Projects/Research Essays/Theses	**10**
5	Others(specify)	
	Total	**140**

B. Course Objectives and Learning Outcomes

This course covers several techniques 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.

2. Course Main Objective

The student will be taught as follows:
1. Understanding the Fundamental concepts and basics knowledge of calculus.
2. Studying some application of the derivative in problems such as: Determining absolute and relative extreme, solving related rates problems and analyze and sketch the graph of a function of one variable.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Identify the fundamental concepts and basics knowledge of calculus.	K1
1.2	Recognize the intuitive knowledge of limits and continuity of a function.	K5
2	**Skills:**	
2.1	Employ limit and continuity (graphically and analytically).	S4
2.2	Apply all type of functions by using the techniques of differentiation.	S4
2.3	Explain maximum, minimum, and related rates problems using differentiation.	S4
3	**Values:**	
3.1		

C. Course Content

No	List of Topics	Contact Hours
1	Trigonometric Functions and their Inverse Functions.	6
2	Hyperbolic Functions and their Inverse- The Concept of Limit-Computation of Limits.	6
3	Limits Involving Infinity-Asymptotes-Continuity & 1st Exam	6
4	The tangent Lines and Rates of Change- Derivatives Rule- The Product and Quotient Rules- the Chain Rule.	6
5	Derivatives of Exponential Functions- Derivatives of Logarithmic Functions - Derivatives of Trigonometric Functions - Derivatives of Inverse Trigonometric Functions.	6
6	Derivatives of Hyperbolic Functions- Derivatives of Inverse Hyperbolic Function and parametric Differentiation-Implicit Differentiation.	6
7	Applications of differentiation, Maximum and Minimum Values- Increasing and Decreasing Functions- Concavity and the Second Derivative.	6
8	L'Hospital's Rule- Indeterminate Forms & 2nd Exam	6
9	Rolle's Theorem- Mean-Value Theorem	6
10	Maclurin's and Taylor's Theorem.	6
Total		**60**

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	<u>Identify</u> the fundamental concepts and basics knowledge of calculus	• Lectures • Group discussions	• Quizzes • Assignments
1.2	<u>Recognize</u> the intuitive knowledge of limits and continuity of a function.	• Lectures • Group discussions	• Exams • Assignments
2.0	**Skills**		
2.1	<u>Employ</u> limit and continuity (graphically and analytically).	• Interactive classes • Group discussions	• Quizzes • Assignments
2.2	<u>Apply</u> all type of functions by using the techniques of differentiation.	• Lectures • Group discussions	• Exams
2.3	<u>Explain</u> maximum, minimum, and related rates problems using differentiation.	• Lectures • Self-learning through the website	• Exams • Quizzes • Assignments
3.0	**Values**		
3.1	Show the responsibility for their own learning and continuing personal and professional development.	Projects.	Through the oral presentation of the projects.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	**Quizzes + Home works**	**Continues**	**10 %**
2	**Midterm exam 1**	**5th**	**20 %**
3	**Midterm exam 2**	**8th**	**20 %**
4	**Final exam**	**11th**	**50 %**

*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:
There are 6 hours per week during the Semester for this purpose announced in the beginning of the semester.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	**J. Stewart, (2012), Calculus: Early Transcendentals,7th edition, USA, Brooks/Cole**

Essential References Materials	**H. Anton, I. Bivens and S. Davis, (2010), Calculus: Early Transcendentals, International Student Version, 10th Edition, USA, John Wiley & Sons, Inc.**
Electronic Materials	• http://www.sosmath.com/calculus/calculus.html • http://archives.math.utk.edu/visual.calculus/index.html
Other Learning Materials	**Black Board system**

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers**
Technology Resources (AV, data show, Smart Board, software, etc.)	**Data show and Smart Board**
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	**Wi-Fi internet connections**

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course is well organized and easy to navigate	**Students**	Indirect
Quality of learning resources	**Students**	Indirect
Effectiveness of teaching and assessment	**Students**	Indirect
Extent of achievement of course learning outcomes	**Peer reviewer**	Direct

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	**Department Council**
Reference No.	7
Date	16-6-1443 H