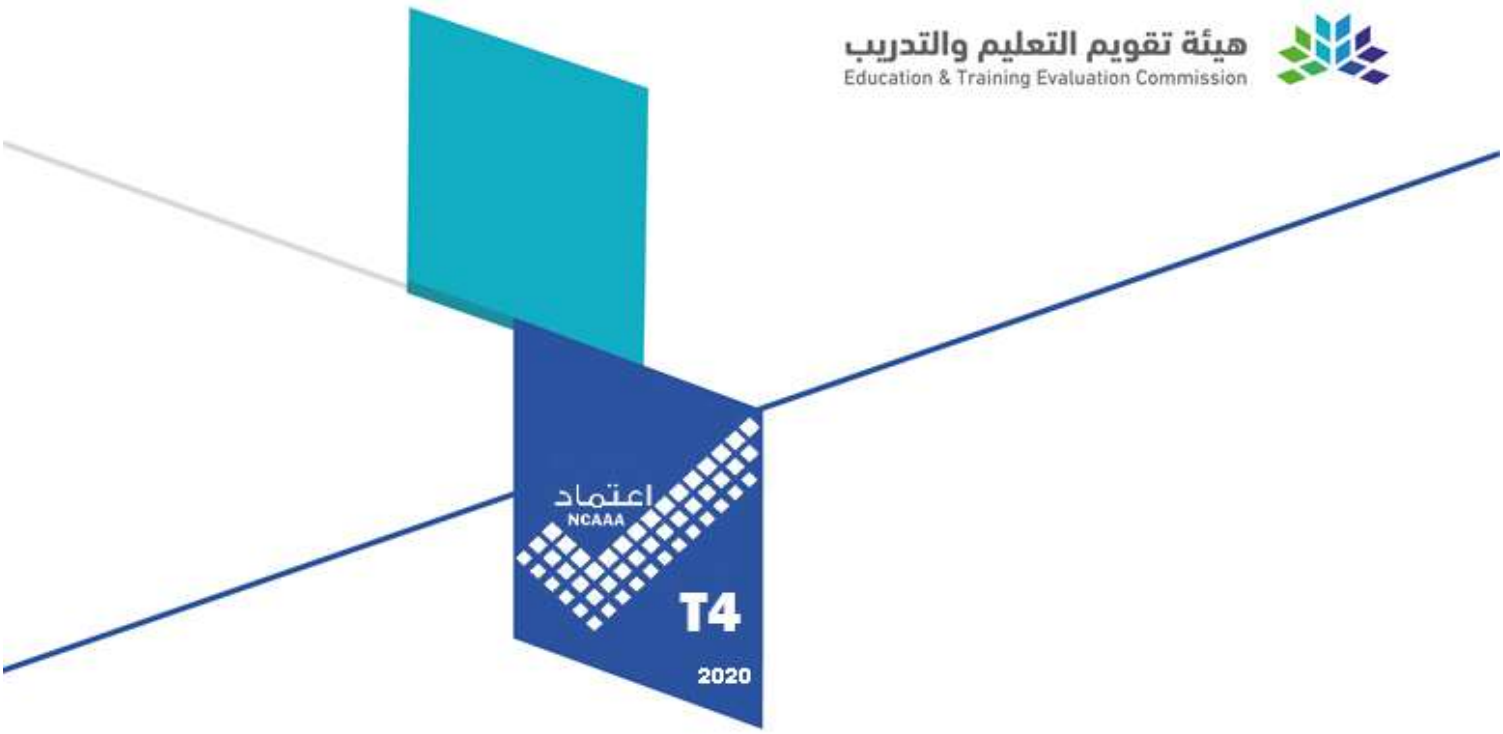
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Differential Calculus**
Course Code:	**MATH1102**
Program:	**General Course**
Department:	**Mathematics**
College:	**Science**
Institution:	**University of Tabuk**

Table of Contents

A. Course Identification

1. Credit hours: 4 Hours/Week
2. Course type **a.** University [√] College [ ] Department [ ] Others [ ] **b.** Required [√] Elective [ ]
3. Level/year at which this course is offered: First Year
4. Pre-requisites for this course (if any)**: MATH1101** .
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	40	**100 %**
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other (Group discussion)**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	40
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers topics of calculus of single variable functions including limits and continuity, derivatives and antiderivative. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics, taking into account student's majors. Use program packages such as Mathematica, MATLAB or Maple in some scheduled topics if possible

2. Course Main Objective

Upon successful completion of this course, students will be able to:

- Compute limits, derivatives, and antiderivative.
- Analyze functions using limits, derivative, and anti-derivative.
- Recognize the appropriate tools of calculus to provide and solve applied problems.
- A Mathematical software tool to implement that graphs functions and performs many standard calculus operations

3. Course Learning Outcomes

	CLOs	Aligned-PLOs
1	**Knowledge and Understanding**	
1.1	Define the different types of functions, properties and forms and use it to express some natural phenomena	ILO 1
1.2	Recognize the basic concepts of limits, continuity, differentiation and anti-differentiation, and the relationship between them	ILO 1
1.3	Recognize the basic rules and theories of differentiation	ILO 1
1.4	Define calculus concepts and techniques to provide mathematical models of real-world situations	ILO 1 + 5
2	**Skills:**	
2.1	Apply the rules continuity at a point or on intervals to distinguish between the types of discontinuities at a point	ILO 1
2.2	Compute limits, derivatives, antiderivatives for a various types of functions	ILO 1
2.3	Analyze functions and their graphs as informed by limits and derivatives	ILO 1
2.4	Apply differentiation to solve real world problems such as rate of change and optimization	ILO 1 + 3
3	**Values:**	
3.1	Demonstrate proficiency in communicating calculus concepts.	ILO 5
3.2	Demonstrate proficiency in individual and group work.	ILO 3

C. Course Content

No	List of Topics	Contact Hours
1	The Limits of a Function.	4 hrs
2	Calculating Limits Using the Limits Laws .	4 hrs
3	Continuity, Limits at Infinity.	4 hrs
4	Derivatives as a Function, Derivatives of Polynomials and Exponential Functions.	4 hrs
5	The Product and Quotient Rules, Derivatives of Trigonometric Functions.	4 hrs
6	The Chain Rule, Implicit Differentiation.	4 hrs
6	**Mid-Exam#**	
7	Derivatives of Logarithmic and Inverse Trigonometric Functions	4 hrs
8	Higher Derivatives , L'H'opital Rule .	4 hrs
9	Maximum and Minimum Values, Mean Value Theorem ,The Derivative Test.	4 hrs
10	Indeterminate Forms and Optimization Problems, Antiderivatives.	4 hrs
11-12	**Revision & Final-Exam**	
Total		**40 hrs**

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	Define function with its different types, properties and forms and use it to express some natural phenomena	• Traditional lectures. • Group discussions. • Cooperative learning. • Self-learning through the website. .	• Exams. • Activities Class. • Quizzes. • Assignments.
1.2	Understand the basic concepts of limits, continuity, differentiation and anti-differentiation, and the relationship between them		
1.3	Know the basic rules and theories of differentiation		
1.4	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations		
2.0	**Skills**		
2.1	Determine continuity at a point or on intervals and distinguish between the types of discontinuities at a point	• Traditional lectures. • Group discussions. • Cooperative learning. • Self-learning through the website.	• Exams. • Assignments. • Quizzes.
2.2	Compute limits, derivatives, antiderivatives for a various types of functions		
2.3	Analyze functions and their graphs as informed by limits and derivatives		
2.4	Use differentiation to solve real world problems such as rate of change and optimization		
3.0	**Values**		
3.1	Realize the importance of the computational principles of calculus to the solutions of various mathematical problems.	• Group discussions. • Cooperative learning. • Projects.	• Assignments. • Class Activities. Oral exams.
3.2	Present mathematics clearly and precisely to an audience of peers and faculty.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home works	Weekly basis	10%
2	Quizzes	Weekly basis	10%
3	Activities	Weekly basis	5%
4	Mid Exam	5th week	25%
5	Final Exam	At end of the Semester	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 :

The presence of faculty members to provide advice, academic advice and academic guidance to the student in need within the six hours a week available to all students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Calculus Early Transcendentals, by James Stewart Published by Brooks Cole 9th Edition 2019
Essential References Materials	• Calculus Early Transcendentals, by H. Anton, I. Bivens and S. Davis Published by WILEY 10th Edition 2012 • Thomas' Calculus, by Joel R. Hass, Christopher E. Heil Maurice D. Weir, 14th edition 2018
Electronic Materials	موقع د. جيمس ستيوارت (موقع مساند للمرجع الرئيسي) https://stewartcalculus.com/ موقع البروفيسور ليونارد لتعليم الرياضيات https://www.patreon.com/ProfessorLeonard دورات معهد ماساتشوستس للتكنولوجيا المفتوحة https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/ المكتبة الرقمية السعودية https://www.sdl.edu.sa/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room with capacity of 30 students and equipped with and internet connection. • Library
Technology Resources (AV, data show, Smart Board, software, etc.)	• White board • Smart board • Data Show • Sound system • Computer lab equipped with supporting software.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Mathematical software

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and Teaching Effectiveness Survey	Students	Indirect
Course Report	Instructors	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	Study plans and programs committee
Reference No.	
Date	13/06/2022