Course Specification
(Bachelor)

Course Title:	Calculus
Course Code:	MATH 0113
Program:	BSc in Physics and BSc in Physics of Renewable Energy and Environment
Department:	Department of Physics
College:	College Science
Institution:	Majmaah University
Version:	2024
Last Revision Date:	23 Dec. 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (3,0,0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (First Level/ First Year)					
4. Course general Description:					
Calculus is the first of the required courses in the program. This course introduces a course in single-variable calculus. Key topics of the course include real numbers, functions and graphing, limits and continuity, derivatives, derivative applications, integrals, and applications of integration. Concepts of differential and integral calculus is applied to trigonometric, inverse trigonometric, and transcendental functions					
5. Pre-requirements for this course (if any)**:**					
none					
6. Co-requisites for this course (if any)**:**					
none					
7. Course Main Objective(s):					
The primary objective of the course is to introduce students to the concepts of calculus and to develop the student's confidence and skill in dealing with mathematical expressions. To achieve this goal, the course will help the student understand the following basic concepts: limits, continuity, and derivatives involving real-valued functions of one variable (including algebraic, trigonometric, exponential, and logarithmic functions).					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
Total		45

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	Know real numbers, Exponents and Radicals. Polynomials: Basic Operations and Factoring, Solving Equations. Rational Expressions: Basic Operations. Inequalities. Absolute Values	K1	-Lectures -Group Discussion -Exercises	-Mid Exams - discussions & participations -Final Exam -Homework
1.2	Understand the definition of Functions (Domain and Range)- Graphs of Functions- Operations on Functions- Trigonometric	K1		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	Functions and Identities Limits Introduction to Limits- Theorems on limits- Limit from Right and from Left - Definition of Continuity			
1.3	Recognize the definition of Derivative (Using Limits) - Rules and Theorems for Finding Derivatives - Derivative of Trigonometric Functions - Chain Rule - Higher Order Derivatives - Implicit Differentiation Applications of the derivative Maxima and Minima – Monotonicity - Local Maxima and Minima - Concavity- Sketching Graphs.	K1		
1.4	Know the Integration of Functions and Definite Integrals.	K1		
2.0	**Skills**			
2.1	Correlate and understand the problem-solving techniques.	S2	-Problem solving -Class discussion	-Final Exam -Homework -Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Interpret/operate differentiation and Integrations.	S2		
3.0	Values, autonomy, and responsibility			
3.1	Work effectively in groups as well as individuals.	V3	-Discussion with students -Making students aware about time management in completing their assignments. Encourage students to help each other. Group presentation/ Group assignments	-Presentation -Discussion and Homework
3.2	Present a short report in a written form and orally using appropriate scientific language.	V1		

C. Course Content

No	List of Topics	Contact Hours
1.	Brief Review Real numbers, Exponents and Radicals. Polynomials: Basic Operations and Factoring, Solving Equations. Rational Expressions: Basic Operations. Inequalities. Absolute Values	10
2.	Midterm 1	1
3	Functions Definition of Functions (Domain and Range)- Graphs of Functions- Operations on Functions- Trigonometric Functions and Identities	12

	Limits Introduction to Limits- Theorems on limits- Limit from Right and from Left - Definition of Continuity	
4	Midterm 2	1
5	Differentiation Definition of Derivative (Using Limits) - Rules and Theorems for Finding Derivatives - Derivative of Trigonometric Functions - Chain Rule - Higher Order Derivatives - Implicit Differentiation Applications of the derivative Maxima and Minima – Monotonicity - Local Maxima and Minima - Concavity- Sketching Graphs.	14
7	Integration Integration of Functions Definite Integrals.	7
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm1	7th	20%
2.	Midterm2	12th	20%
3.	Homework	Through of semester	5%
4	Electronic Test	13th week	10%
5	Presentation	Through of semester	5%
6	Quizzes	Through of semester	5%
7	Final exam	End of semester	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

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E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	-Single Variable Calculus: Early Transcendental seventh edition James Stewart. Cengage learning 2011-13:978 -0-538-49857-8 0:978 -0-538-49867-6 -Calculus /Smith/Minton Mc Graw Hill-2012-9780071316576 -Calculus and analytical Geometry (9th Edition) / George B. Thomas, Ross L. Finney/ Addison-Wesley publishing company/1996
Supportive References	
Electronic Materials	Saudi Digital Library (SDL) https://www.wikipedia.org/ Web of Knowledge Physics Today (web version) MIT Courseware www.eagle.co.uk/news/ppnews.html http://vlib.org/physics.html http://dir.yahoo.com/science/physics
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with at least 25 seats.
Technology equipment (projector, smart board, software)	Auditorium of a capacity of not less than 100 seats for large lecture format classes.
Other equipment (depending on the nature of the specialty)	A smart board to write on and computer.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program	Indirect
Effectiveness of Students assessment	Students	Direct
Quality of learning resources	Program	Direct
The extent to which CLOs have been achieved	Course coordinator	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**16**
DATE	**30/12/2024**