هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

Course Specification
— (Bachelor)

Course Title: Differential calculus

Course Code: Math 101

Program: The track of scientific colleges

Department: Basic Sciences

College: Common First year

Institution: KSU

Version: 2024

Last Revision Date: 14/8/2024 – 10/2/1446 H

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

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

3. Level/year at which this course is offered: (………)

4. Course General Description:

Fundamental course for Scientific track students "Differential Calculus"

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

N/A

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

N/A

7. Course Main Objective(s):

Course Main Objective:
The student will learn the basic concepts of Differential Calculus

The detailed objectives:
- Define set of numbers
- Solve linear inequality
- Solve quadratic inequality
- Solve rational inequality
- Apply function properties to find its value at a certain point
- Find the value of function composition
- Determine the domain of algebraic functions
- Find the inverse of function
- Define trigonometric functions
- Determine the domain of trigonometric functions
- Define inverse of trigonometric functions
- Calculate relations has trigonometric functions
- Prove identities for trigonometric functions
- Define the limit
- Apply limit laws
- Calculate the limit at infinity
- Study continuity of function
- Apply Intermediate Value Theorem

- Find the derivative by definition
- Find the derivative algebraically
- Find the slope of curve at a given point
- Apply derivatives laws
- Find the derivative using the chain rule
- Find the implicit derivative
- Find the derivative of the higher order
- Find a derivation of inverse functions
- Determine the extrema values of the function
- Apply Rolle's Theorem
- Apply the of mean value theorem
- Study the increasing and decreasing intervals of function
- Determine the concavity of the function curve
- Draw curve of function

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5	
2	E-learning	NA	
3	Hybrid • Traditional classroom • E-learning	NA	
4	Distance learning	NA	

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	75
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify) "Online Revision"**	6
Total		81

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define set of numbers		Lectures. Cooperative learning	Home works (Paper and electronic) and midterm and final exam
1.2	Define trigonometric functions			
1.3	Define inverse of trigonometric functions			
1.4	Define the limit			
1.5	Define the chain rule			
1.6	Define the derivative of the higher order			
2.0	**Skills**			
2.1	Apply the properties of the functions and its composition		Lectures. Cooperative learning	Home works (Paper and electronic) and midterm and final exam
2.2	Find the domain of a function.			
2.3	Find the inverse functions of trigonometric functions			
2.4	Calculates the limit of the function at a point			
2.5	Calculates the limit of the function at infinity			
2.6	Distinguish between the continuous and discontinuous functions			
2.7	Determine the intervals of continuous functions			
2.8	Apply the derivative rules			
2.9	Solve derivative applications			
3.0	**Values, autonomy, and responsibility**			
3.1	Co-operation		Cooperative learning	Exercise in class
3.2	Self-confidence		Self-learning	Homework
...				

C. Course Content

No	List of Topics	Contact Hours
1.	1.1 Sets and inequalities 1.2 Definition of the function 1.3 Properties of the functions 1.4 Composition of functions 1.5 Trigonometric functions 1.6 Inverse of trigonometric functions	20
2.	2.1. Limits 2.2. Laws of limits 2.3. Limits at infinity 2.4. Continuity of functions	20
3.	3.1. Derivative and slop of tangent line at a point 3.2. Laws of derivatives 3.3. Derivative of trigonometric function 3.4. Chain Rule 3.5. Implicit derivative 3.6. Higher order derivative 3.7. Derivative of inverse functions	20
4.	4.1. Extrema of function 4.2. Rolle's Theorem 4.3. Mean Value Theorem 4.4. Increasing and decreasing of functions 4.5. Concavity of function 4.6. Sketching a curve	15
Total		75

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	5 and 11	8%
2.	Electronic Homework	4 and 8	7%
3.	Activities	Continues	10%
4.	Midterm exam	9	25%
5.	Final Exam	17	50%
6.	**Total**		**100%**

*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	Text Book: DIFFERENTIALCALCULUS: Fifth Edition. Year: 2022 Authors: Dr. Ibraheem Alolyan, Dr. Nasser Bin Turki, Dr Tahsin Ghazal, Dr. Obaid Al-Gahtani and Dr. Khaled Khashan
Supportive References	Anton, H; Bivens, I & Davis, S. Calculus Early Transcendental, Ninth Edition, Wily & Sons 2009. Swokowski, E, W; Olinick, M; Penece, D. Calculus, Sixth Edition, PWS Publishing Company, 1994.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

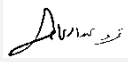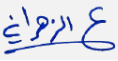| Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Class room for 22 students for one room
Technology equipment (projector, smart board, software)	Smart classroom.
Other equipment (depending on the nature of the specialty)	Resources room.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	By the instructor and student	Periodic visits and Student questionnaire
Effectiveness of Students assessment	By the instructor and teachers	Discussion sessions
Quality of learning resources		
The extent to which CLOs have been achieved		Exam
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Course Coordinator : Dr. AMR ABDELATY Signature: Head of Department of Basic Sciences: Dr. Abdul Rahman Al-Zahrani Signature:
REFERENCE NO.	1
DATE	14/2/1446H - 18/8/2024