Course Specifications

Course Title:	Calculus I
Course Code:	101 Math-4
Program:	Bachelor of Science (Mathematical Sciences)
Department:	Mathematics
College:	Art & Sciences
Institution:	Najran University
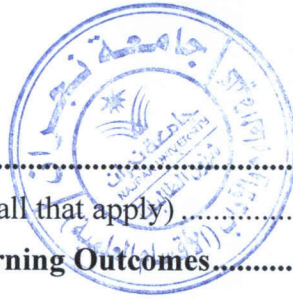
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A. Course Identification

1. Credit hours: 4

2. Course type

a. University ☐ College ☐ Department ■ Others ☐

b. Required ■ Elective ☐

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

4. Pre-requisites for this course (if any): **none**

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	٣	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	10
4	Others (Exams)	4
	Total	59
Other Learning Hours*		
1	Study	30
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	
5	Others (specify)	
	Total	109

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to cover topics in Pre-calculus (the real numbers, factoring, rational expressions, exponents and radicals, solving equations and inequalities (including linear, quadratic, fractional, radical, and absolute value), functions (including linear, polynomial, rational, root, absolute value, exponential, logarithmic, trigonometric, composition), and graphing.), and the Differential Calculus. It includes limits and continuity, derivatives, and applications of derivatives. The types of functions studied include algebraic, trigonometric, exponential and logarithmic.

2. Course Main Objective

Students are expected to have strong and sound understanding of the differentiation calculus in term of its concepts, techniques and theorems. Students are expected to apply them on studying the behavior of a function.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Describe the real number system	
1.2	Define the basic concepts of equations, inequalities, and functions, and their rules, which will be cover in this course.	LO2
1.3	Define the limit and the continuity of functions, and its derivatives on the real numbers system	
1...		
2	**Skills :**	
2.1	Solve the equations and the inequalities, with Absolut value in one variable.	
2.2	Find the domain, the range, and the inverse of a function and their properties to sketch curve of it	
2.3	Apply the properties of exponential and logarithmic functions for specific equations and applications	
2.4	Evaluate the limits of a function, as x approaches any real number a. and at an infinite	LO2
2.5	Determine where a function is either continuous or not at a point or on the interval.	
2.6	Find the derivative of functions (in 1st degree, and the higher degree)	
2.7	Find Taylor series for functions	
2.8	Apply the derivative of functions for studying the behavior of functions	
2.9	Sketch the curve of a function	
3	**Competence:**	
3.1	Illustrate the limit of a function using a table of values and the graph of the function	
3.2	Show the relation between the limit concept and the derivative of a function.	
3.3		LO2
3.4		
3.5		

C. Course Content

No	List of Topics	Contact Hours
1.	**Review**	
1.1	Sets and Real Numbers.	2
1.2	Equations and Inequalities	4
1.3	Equations and Inequalities Involving Absolute Value	4
1.4	Functions and their Domains	2
1.5	Inverse Functions	2
2.	**Limits and Continuity**	
2.1	Definition of Limits	2
2.2	Limits Laws	5
2.3	Limits Involving Infinity	2
2.4	Continuity of Functions	3
3.	**The Derivative**	
3.1	The Limit definition of derivative & the Tangent Line Problem	3
3.2	Differentiation Rules	5
3.3	Derivative of Trigonometric Functions	2
3.4	The Chain Rule	3
3.5	Derivative of Logarithmic and Exponential Functions	2
3.6	Implicit Differentiation	3
3.7	Higher Order Derivatives	2
3.8	The Derivative of Inverse Functions	2
4.	**Application of Derivative**	
4.1	Indeterminate Form and L'hoptail Rule	3
4.2	The Mean Value Theorem	2
4.3	Taylor series for Functions	2
4.4	Extreme Values of Functions	4
4.5	Monotonic Behavior of Functions	4
4.6	Concavity and the Inflection Points	2
4.7	Sketching Curve of Functions	6
4.8	Optimization Problems	4
Total		75

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	**Knowledge:**		
1.1	Describe the real number system	Lecture Cooperative learning Problem solving Brain storming Self-Learning	Final Exam
1.2	Define the basic concepts of equations, inequalities, and functions, and their rules, which will be cover in this course.		
1.3	Define the limit and the continuity of functions, and its derivatives on the real numbers system		
1...			

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2	Skills :		
2.1	Solve the equations and the inequalities, with Absolut value in one variable.	Lecture Cooperative learning Problem solving Brain storming Self-Learning	Final Exam
2.2	Find the domain, the range, and the inverse of a function and their properties to sketch curve of it		
2.3	Apply the properties of exponential and logarithmic functions for specific equations and applications		
2.4	Evaluate the limits of a function, as *x approaches any real number a*. and at an infinite		
2.5	Determine where a function is either continuous or not at a point or on the interval.		
2.6	Find the derivative of functions (in 1st degree, and the higher degree)		
2.7	Find Taylor series for functions		
2.8	Apply the derivative of functions for studying the behavior of functions		
2.9	Sketch the curve of a function		
3	Competence:		
3.1	Illustrate the limit of a function using a table of values and the graph of the function	Lecture Cooperative learning Problem solving Brain storming Self-Learning	Final Exam
3.2	Show the relation between the limit concept and the derivative of a function.		
3.3			
3.4			
3.5			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	1st midterm Exam	7th week	20
2	2nd midterm Exam	11TH week	20
3	Assignments & Quizzes	During classes	10
4	Final Exam	At the end	50
8			

*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 :

- Office Hours
- Blackboard

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	صالح السنوسي ، معروف عبد الرحمن ، كمال الهادي عبد الرحمن ، يوسف الخميس : مبادئ التفاضل والتكامل (الجزء الأول) ، مكتبة الملك فهد الوطنية أثناء النشر ردمك 5 – 30 – 38 . 9960 – لعام 1421 هـ .
Essential References Materials	• Anton, H; Bivens, I & Davis, S. Calculus Early Transcendentals, Ninth Edition, Wily & Sons, 2009. • Thomas, Calculus, Pearson Education , Addison Wesley, 2004.
Electronic Materials	• https://www.ck12.org/book/CK-12-Calculus-Concepts/section/1.7/ • https://zr9558.files.wordpress.com/2013/10/thomas_-calculus.pdf
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	Data Show Free software as (Geogebra) https://www.geogebra.org/graphing
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Questioner (Indirect)
achievement of course learning outcomes	Lecturer	Software (Direct)
Quality of learning resources	all	Questioner (Indirect)

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	
Reference No.	
Date	