

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Calculus
Course number	MATH1301
Faculty	
Department	
Course type	Major Needs
Course level	1
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - Understand concepts and develop skills to calculate, analyze and interpret results
- 2 - Learn to think about problems mathematically and to solve problems independently
- 3 - Understand the major problems of differential and integral calculus
- 4 - State and explain basic calculus definitions and theorems
- 5 - Help student to be a problem solver
- 6 - Understand the important applications of the concepts

Intended Learning Outcomes

Knowledge and Understanding	* analyze functions for continuity and differentiability * understand the meaning of the derivative in terms of the rate of change * demonstrate knowledge of curve sketching * understand the relationship between derivatives and integrals * understand the relationship between the process and its inverse * understand the meaning of the derivative by the rate of change * be able to solve algebraic equations and inequalities involving the square root and modulus function
Intellectual Skills	* recognize other important functions as logarithmic and exponential functions * think about problems mathematically and to solve problems independently * introduce mind to the scientific methods of analysis
Professional Skills	* analyze and evaluate limits graphically, numerically and analytically * use the differentiation techniques to find the derivative of the function, tangent lines, normal lines and rate of change * evaluate definite integrals using Fundamental Theorem of Calculus * understand the meaning and the important applications of the concepts
General Skill	* help student to be a problem solver * hone the ability to do reality checks on calculations * learn to work together productively and to work cooperatively * be provided with insight into the power and generality of mathematics

Course Contents

1	-	Precalculus review: algebra- functions- trigonometry
2	-	Limits of functions: introduction to limits- techniques for finding limits- limits involving infinity- continuous functions
3	-	The derivative: tangent lines and rate of change- definition of derivative- techniques of differentiation- derivatives of the trigonometric functions- increments and differentials- the chain rule- implicit differentiation
4	-	Application of the derivative: extrema of functions- the mean value theorem- the first derivative test- concavity and the second derivative test- summary of graphical methods
5	-	Integrals: antiderivatives and indefinite integrals- change of variables in indefinite integrals- the definite integral- properties of the definite integral- the fundamental theorem of calculus-
6	-	Logarithmic and exponential functions: inverse functions- the natural logarithmic function- the natural exponential function- integration- general logarithmic and exponential functions

Teaching and Learning Methods

1	-	lectures
2	-	discussion

Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
First mid-term exam	after 6 weeks of study	25%
Second mid-term exam	after 10 weeks of study	25%
Final Exam	at the end of the semester	50%

Books and References

Essential books	Calculus, fifth edition; Earl W. Swokowski; Pws-Kent Puplicher Company, 1991
Recommended books	Calculus with analytic geometry; Robert Eliis & Dinny Guihk, 1994
	Calculus; Thomas Finny; Addison-Wesely Pupliching Company, Inc 1996
	all calculus books

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
.Algebra - functions - trigonometry	1-3	* recognize the absolute values * distinguish between identities and equations know addition and double-angle formulas for trigonometric functions	* help to think mathematically * help to be a problem solver	* solve inequalities and equations * solve trigonometric equations	learn to work together productively and cooperatively
introduction to limits-techniques for finding limits - limits involving infinity - continuous functions	4-5	* understand continuous functions	introduce mind to the scientific methods of analysis	* calculate limits by substitution and by eliminating zero denominators and to calculate limits as infinity of rational functions use limits to solve problems	* be a problem solver * participate in team work activities outside the class
tangent lines and rate of change - definition of derivative - techniques of differentiation- derivatives of trigonometric functions- increments and differentials- chain rule- implicit differentiation	6-8	* understand the meaning of the derivative * understand the concept of linear approximation * understand the important applications of the concepts	*help students to be a problem solver * introduce mind to the scientific method of analysis	Use differentiation techniques to find derivative of the function tangent lines, normal lines and rate of change.	work together productively and to learn to be cooperative
extrema of functions- the mean value theorem- the first derivative test- concavity and the second derivative test- summary of graphical methods-	9-11	* understand the mean value theorem	introduce mind to the scientific methods of analysis	find precisely the extreme points which play a significant role in applications * to sketch the graph of a function accurately	participate in team work activities outside the class and learn to be cooperative

Antiderivatives and indefinite integrals-change of variables in indefinite integrals-summation notation and area-the definite integral and its properties- the fundamental theorem of calculus	12-14	* understand the concept of indefinite integral as antiderivative * be able to evaluate integrals by substitution with and without suitable hints * know the fundamental theorem of calculus	* introduce mind to the scientific methods of analysis	* utilize these topics in physical applications * help to be a problem solver	* work together productively and learn cooperatively * demonstrate and understand the important applications of the concepts
logarithmic and exponential functions- the natural logarithmic function- the natural exponential functions- integration- general logarithmic and exponential functions	14-15	* study the inverse of the functions and recognize other important functions * integrate functions with certain kinds	* introduce mind to the scientific methods of analysis * motivate student to be a problem solver	* be able to state and explain basic definitions and theorems of calculus * apply the procedures of logarithmic differentiation * communicate mathematics	* participate in a team work activities outside the class and learn to be cooperative * appreciate the importance of mathematics