Engineering Program

Specialization	**Engineering Program Requirements**
Course Number	**21301111**
Course Title	**General Mathematics**
Credit Hours	**(3)**
Theoretical Hours	**(2)**
Practical Hours	**(2)**

Brief Course Description:

Real numbers coordinate planes, lines, distance and circles. Functions: (operations and graphs on functions), limits, continuity, limits and continuity of trigonometric functions. Exponential and logarithmic functions. Differentiation (techniques of differentiation, chain rule, implicit differentiation). Application of differentiation (increase, decrease, concavity). Graphs of polynomials. Applications: Rolls Theorem and Mean-Value Theorem, Integration (by substitution, definite integral, fundamental theorem of Calculus). Application of definite integral (area between two curves, volumes)

Course Objectives:

This course aims to :

1. Understand basic facts and terminology to numbers, coordinate planes ،graphs, and lines.
2. Describe functions, investigate some of their properties, and use the arithmetic operations on functions.
3. Define and calculate limits of functions and use the limits to test the functions for continuity.
4. Derive different types of functions and derive formulas that express the derivative for some functions.
5. Use derivatives to find the rate at which some quantity is chaining, to make reliable graphs of polynomials and rational functions.
6. Evaluate definite and indefinite integrals.
7. Calculate the area between curves.
8. Find volumes of three-dimensional solids.
9. Identify Exponential and logarithmic functions and their properties.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction**	-Real Numbers, Intervals. -Inequalities (Linear, Quadratic, and Fractional) -Absolute Value(Properties, Equations and Inequalities containing Absolute Value) -Coordinate Planes and Graphs.(Cartesian Coordinates, Intercepts and Symmetry) -Lines and Quadratic Equations (Slope, Equation of a Line, Parallel and Perpendicular Lines, Parabolas). -Distance, Mid Point and Circles (Center and Radius of a Circle, Equations of Upper Half and Lower Half of a Circle).	
2.	**Functions and limits**	-Functions and Graphs of functions. -Operations on Functions (Addition, Subtraction, Division, Multiplication and Composition) -Families of Functions (Translations, Reflections). -Domain and Range(Domain of Fraction and Square Root Functions, Domain of Composition, Range of a Quadratic Functions) - Exponential and Logarithmic Functions (Definition, Properties and Graphs, Natural Logarithm, Equations containing Exponents and Logarithms). -Limits (Definition of One-Sided Limits, Definition of Two-Sided Limit) -Computing limits (Basic Limits, Limits of Rational Functions, and Limits involving Radicals, Limits of Piece-wise Functions and Absolute Value, Infinite Limits and Vertical Asymptotes). -Computing Limits; End Behavior (Basic Limits, Limits of Polynomials and Rational Functions, Limits involving Radicals and Absolute Value. Horizontal Asymptotes). -Continuity (Definition and Properties, Continuity on Open and Closed Intervals, Squeeze Theorem). -Limits and Continuity of Trigonometric Functions	
3.	**Differentiation**	- Rates of change. -The Derivative. -Techniques of Differentiation. -Derivatives of Trigonometric Functions. -Higher Order Derivatives. -The Chain Rule. -Implicit Differentiation. -Derivatives Involving Exponential and Logarithmic	

		Functions. - Continuity and Differentiability. -Equation of a Tangent Line. -Related Rates.	
4.	**Application of Differentiation**	-Increase, Decrease and Concavity (Definition and Properties, Inflection Points) -Relative Extrema (Critical Points, Relative Maximum and Relative Minimum, First and Second Derivative Tests). -Graphs of polynomials and Rational functions. -Absolute Maxima and Minima (For continuous Functions). -Rolle's Theorem and Mean-Value Theorem.	
5.	**Integration**	-Antiderivatives and the Indefinite Integral (Definition and Properties, Integral Formulas). -The Definite Integral (Definition and Properties). - The fundamental Theorem of Calculus (Two parts) -Evaluating Integrals by Substitution. -Integrals Involving Exponential and Logarithmic Functions.	
6.	**Application of the Definite Integral**	-Area Between Two Curves. -Volumes by Discs and Washers.	

Evaluation Strategies:

Exams			**Percentage**	**Date**	
Exams		First Exam	20%		
		Second Exam	20%		
		Final Exam	50%		
Homeworks			10%		

Teaching Methodology:

- ❖ Lecture
- ❖ Help Sessions

Text Books & References:

Textbook:

1. Calculus, Howard Anton, Irl Bivens and Stephen Davis, 8th Edition, John Wiley and Sons Inc., New York 2005.