



College of Science
Department of Mathematics
Course syllabus: Fundamentals of Mathematics
First semester 2020/2021

1. Instructor Information:

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2. Course Description:

Linear equations: linear equations and inequalities, graphs and lines, functions and graphs; Functions: elementary functions, graphs and transformations, quadratic functions, polynomial and rational functions, exponential functions, logarithmic functions; Systems of linear equations and matrices: systems of linear equations in two variables, systems of linear equations and augmented matrices, matrices basic operations; Linear inequalities and linear programming: linear inequalities in two variables, systems of linear inequalities in two variables; Logic: sets; Limits and the derivative: introduction to limits, infinite limits and limits at infinity, continuity, the derivative, basic differentiation properties, differentials; Additional derivative topics: the constant e and continuous compound interest, derivatives of exponential and logarithmic functions, derivatives of products and quotients, the chain rule, implicit differentiation; Graphing and optimization: first derivative and graphs, second derivative and graphs, L'Hôpital's rule, absolute maxima and minima; Integration: antiderivatives and indefinite integrals, integration by substitution, the definite integral, the fundamental theorem of calculus; Additional integration topics: area between curves, integration by parts.

3. Course Information:

Course number: 401105	Course Title: Fundamentals of Mathematics	Level: First year
Course Nature: Theoretical	Prerequisite: None	Lecture time: Online
Academic year: 2020 – 2021	Semester: First	Credit Hours: 3

4. Course Objectives:

Course learning objectives are listed below:

1. Learn the general concept of equations, inequalities and functions (solving and sketching the graph).
2. Learn to work with exponential and logarithmic functions and their applications in applied problems.
3. Learn the concepts of the derivative and its underlying concepts such as limits and continuity.
4. Learn to calculate derivative for various type of functions using definition and rules.
5. Apply the concept of derivative to completely analyze graph of a function.
6. Learn about various applications of the derivative in applied problems.
7. Learn about anti-derivative and its applications.
8. Learn to use concept of integration to evaluate geometric area and solve other applied problems.

5. Intended Student Learning Outcomes:

Successful completion of the course should lead to the following outcomes:

- Knowledge and Understanding Skills:** Student is expected to
 - Solve linear systems of two equations or inequalities with two variables.
 - Calculate the limit for various types of functions.
 - Determine whether a given function is continuous at a certain point.
 - Differentiate and integrate various types of functions.
- Intellectual Analytical and Cognitive Skills:** Student is expected to
 - Students should be able to use mathematical symbols as well as calculus concepts (limits, continuity, derivatives, applications of the derivative, antiderivative, the definite and indefinite integral, and the Fundamental Theorem of Calculus) to analyze, graph, and solve real world problems.

3. **Subject- Specific Skills:** Student is expected to
- 3.1. Solve linear system of two linear equation with two variables in using elimination method, substitution method and augmented matrix method.
 - 3.2. Solve linear system of two inequalities with two variables.
 - 3.3. Calculate limits and determine continuity for functions.
 - 3.4. Perform differentiation and integration correctly.
4. **Creativity /Transferable Key Skills/Evaluation:** Student is expected to
- 4.1. Use mathematical symbols and mathematical structures to model and solve real world problems.
 - 4.2. Choose the correct use of quantifiable measurements of real-world situations.

6. Course Content:

Week	Chapter	Subject	Pages and Assignments
1 + 2	Chapter 1 Linear Equations and Graphs	1.1 Linear Equations and Inequalities 1.2 Graphs and Lines	22 - 46 all odd questions
2 + 3 + 4	Chapter 2 Functions and Graphs	2.1 Functions 2.2 Elementary Functions: Graphs and Transformations 2.3 Quadratic Functions 2.4 Polynomial and Rational Functions 2.5 Exponential Functions 2.6 Logarithmic Functions	62 - 137 all odd questions
5 + 6	Chapter 4 Systems of Linear Equations; Matrices	4.1 Review: Systems of Linear Equations in Two Variables 4.2 Systems of Linear Equations and Augmented Matrices 4.4 Matrices: Basic Operations	193 - 216 230 - 242 all odd questions
6	Chapter 7 Logic, Sets, and Counting	7.2 Sets	374 - 381 all odd questions
7 + 8 + 9	Chapter 10 Limits and the Derivative	10.1 Introduction to Limits 10.2 Infinite Limits and Limits at Infinity 10.3 Continuity 10.4 The Derivative 10.5 Basic Differentiation Properties 10.6 Differentials	508 - 577 all odd questions
10 + 11	Chapter 11 Additional Derivative Topics	11.1 The Constant e and Continuous Compound Interest 11.2 Derivatives of Exponential and Logarithmic Functions 11.3 Derivatives of Products and Quotients 11.4 The Chain Rule 11.5 Implicit Differentiation	594 - 634 all odd questions
12 + 13	Chapter 12 Graphing and Optimization	12.1 First Derivative and Graphs 12.2 Second Derivative and Graphs 12.3 L'Hôpital's Rule 12.5 Absolute Maxima and Minima	651 - 694 707 - 715 all odd questions
14 + 15	Chapter 13 Integration	13.1 Antiderivatives and Indefinite Integrals 13.2 Integration by Substitution 13.4 The Definite Integral 13.5 The Fundamental Theorem of Calculus	733 - 789 all odd questions
16	Chapter 14 Additional Integration Topics	14.1 Area Between Curves 14.3 Integration by Parts	795 - 805 817 - 823 all odd questions

7. Teaching and learning Strategies and Evaluation Methods:

Learning Outcomes	Teaching Strategies	learning Strategies	Evaluation Methods
1) Learn the concept of linear equations and graphs. 2) Solve systems of linear equations. 3) Understand the concept of linear inequalities. 4) Solve system of linear inequalities. 5) Solve basic operation on matrices.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - First exam
1) Learn the concepts of the derivative and its underlying concepts such as limits and continuity. 2) Learn to calculate derivative for various type of functions using definition and rules. 3) Apply the concept of derivative to completely analyze graph of a function. 4) Learn about various applications of the derivative in applied problems.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - Second exam
1) Learn about anti-derivative and the Fundamental Theorem of Calculus and its applications. 2) Learn to use concept of integration to evaluate geometric area and solve other applied problems.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - Final exam

8. Assessment:

Assessment	Grade	Exam Type	Week
Class Work (Quizzes, Homework and Attendance of the lecture)	10		
Mid Exam	40	TBA	Within the 6th and 8th Week
Final Exam	50	TBA	TBA
Total	100		

9. Text Book:

The main reference	College Mathematics for Business, Economic, Life Sciences, and Social sciences
Author(s)	Raymond A. Barnett, Michael R. Ziegler and Karl E. Byleen
Year	2015
The edition	13th edition

10. References and additional resources:

1)	Howard Anton, IrI C. Bivens and Stephen Davis, Calculus, Late Transcendentals, 9th Edition, Wiley.
2)	Calculus, EARLY TRANSCENDENTALS, 12th by Thomas
3)	Calculus: Early Transcendentals, 4th Edition, Dennis Zill and Warren S. Wright, Jones and Bartlett Publishers 2011.