COLLIN COLLEGE EXPANDED GENERIC COURSE SYLLABUS

COURSE INFORMATION

Course Number: MATH 1324
Course Title: Mathematics for Business & Social Sciences
Credit Hours: 3
Lecture Hours: 3
Lab Hours: 0

Prerequisite

MATH 0314 with a grade of C or better, or MATH 0324 with a grade of C or better, or meet TSI college-readiness standard for Mathematics; or equivalent.

Course Description

The application of common algebraic functions, including polynomial, exponential, logarithmic, and rational, to problems in business, economics, and the social sciences are addressed. The applications include mathematics of finance, including simple and compound interest and annuities; systems of linear equations; matrices; linear programming; and probability, including expected value.

Textbook/Supplies

Finite Mathematics with Applications in the Management, Natural, and Social Sciences, Lial, Hungerford, Holcomb & Mullins, 13th edition, Pearson.

Supplies: TI Graphing calculator required.

STUDENT LEARNING OUTCOMES (SLO)

Upon completion of this course the students should be able to do the following:

1. Apply elementary functions, including linear, quadratic, polynomial, rational, logarithmic, and exponential functions to solving real-world problems. (Critical Thinking and Communication Skills)
2. Solve mathematics of finance problems, including the computation of interest, annuities, and amortization of loans. (Empirical/Quantitative and Critical Thinking)
3. Apply basic matrix operations, including linear programming methods, to solve application problems. (Critical Thinking and Communication Skills)
4. Demonstrate fundamental probability techniques and application of those techniques, including expected value, to solve problems. (Empirical/Quantitative and Critical Thinking)
5. Apply matrix skills and probability analysis to model applications to solve real-world problems.

REQUIRED CORE OBJECTIVES FOR MATHEMATICS

As per the Texas Higher Education Coordinating Board, mathematics students must develop and demonstrate the following three required core objectives:

- Critical Thinking Skills - creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.
- Communication Skills - effective development, interpretation and expression of ideas through written, oral and visual communication.
- Empirical and Quantitative Skills - manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

METHOD OF EVALUATION

Course requirements

Attending lectures, completing assignments, completing required exams and core assessments, and knowledge of calculator use are all required.

Course format

Lecture and guided practice.

A minimum of three proctored exams, three core assessments, online homework, and a proctored comprehensive departmental final exam are required. Online homework is required and must be incorporated in the overall course grade. The final exam grade must count at least as much as any regular exam. Graded core assessments will count for 5%–10% of the overall course grade. The specific weight of each evaluation component will be detailed in the individual instructor's syllabus. Credit for all out-of-class coursework—including homework assignments, service-learning projects, and other assessments and learning activities—may not exceed 25% of the total course grade. At least 75% of a student's grade must consist of proctored exams. No student may retake any of these exams.

Core Assessment Statement

Core assessments consist of problems or tasks that measure student achievement of state required core objectives – Critical Thinking Skills, Communication Skills, and Empirical and Quantitative Skills. These assessments are designed to be meaningful and require students to extend and apply course concepts. Students should be able to clearly see how these assessments reflect both the skills they are developing and the outcomes of the course.

COURSE POLICIES

College-wide policies are pre-loaded into the Concourse Syllabi and are not duplicated in the Expanded Generic Syllabi for each course. Instructor specific policies should be added to the Concourse Syllabus.

COURSE CONTENT

Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definitions and statements of theorems for each section outlined in the following modules.

Module 1: Linear Equations and Functions

The student will be able to:

1. Determine the domain and range of functions. (SLO 1)
2. Evaluate functions including difference quotient and piecewise-defined functions. (SLO 1)
3. Calculate the composition of functions. (SLO 1)
4. Graph linear functions including supply, demand, revenue, cost, and profit. (SLO 1)
5. Write the equation of a line, given information about its graph. (SLO 1)
6. Use appropriate technology to graph functions. (SLO 1)
7. Solve a system of linear equations in two variables using substitution and elimination. (SLO 1)
8. Model the cost function, price-demand function, revenue function, and profit function. (SLO1)
9. Determine and interpret slope as it applies to business applications including marginal analysis. (SLO 1)
10. Given a linear revenue function and a linear cost function, or a linear profit function, calculate the break-even point. (SLO 1)
11. Given a linear price-demand function and a linear price-supply function, find the equilibrium point. (SLO 1)

Module 2: Special Functions

The student will be able to:

1. Determine the vertex of a quadratic function algebraically. (SLO 1)
2. Determine whether a quadratic function has a maximum value or a minimum value at the vertex. (SLO 1)
3. Determine the zeros of a quadratic function. (SLO 1)
4. Graph quadratic functions including supply, demand, revenue, cost, and profit. (SLO 1)
5. Given a revenue function and a cost function with at least one being quadratic, or a quadratic profit function, calculate the break-even point. (SLO 1)
6. Given a price-demand function and a price-supply function with at least one being quadratic, calculate the equilibrium point. (SLO 1)
7. Maximize revenue or profit and minimize cost. (SLO 1)
8. Graph the basic functions (Identity, Constant, Power, Absolute Value, and Root). (SLO 1)
9. Graph and interpret transformations of functions. (SLO 1)
10. For a polynomial function, identify the degree, the maximum number of zeros, and the end behavior. (SLO 1)
11. Determine the real zeros of a polynomial function algebraically and/or graphically. (SLO 1)
12. Given a rational function, determine the domain. (SLO 1)
13. Given a rational function, determine any vertical or horizontal asymptotes. (SLO 1)
14. Graph rational functions. (SLO 1)

15. Use polynomial or rational functions to solve applications. (SLO 1)
16. Graph piecewise-defined functions. (SLO 1)
17. Use appropriate technology to calculate and graph the regression equation that models given data. (SLO 1)

Module 3: Matrices

The student will be able to:

1. Add and subtract matrices, including applications. (SLO 3)
2. Organize and interpret data stored in matrices. (SLO 3, 5)
3. Multiply a matrix by a scalar, including applications. (SLO 3)
4. Multiply two matrices, including applications. (SLO 3)
5. Use matrices and elementary row operations to solve systems of equations with unique solutions, including applications. (SLO 3)
6. Use matrices and elementary row operations to solve systems of equations with non-unique solutions, including applications. (SLO 3, 5)

Module 4: Inequalities and Linear Programming

The student will be able to:

1. Graph and solve linear inequalities in two variables. (SLO 3)
2. Solve systems of linear inequalities in two variables. (SLO 3)
3. Use graphical methods to determine the optimum value of a linear function subject to constraints, including applications. (SLO 3)
4. Use the simplex method to maximize functions subject to constraints, including applications. (SLO 3)

Module 5: Exponential and Logarithmic Functions

The student will be able to:

1. Graph a basic exponential function. (SLO 1)
2. Graph base e exponential functions. (SLO 1)
3. Define the logarithmic functions as the inverse of an exponential function. (SLO 1)
4. Write a logarithmic function in exponential form and an exponential function in logarithmic form. (SLO 1)
5. Determine the domain of logarithmic functions. (SLO 1)
6. Graph a basic logarithmic function. (SLO 1)
7. Use the properties of logarithmic functions to simplify logarithmic expressions. (SLO 1)
8. Solve logarithmic equations. (SLO 1)
9. Evaluate logarithms using technology.
10. Use logarithms to solve exponential equations. (SLO 1)
11. Use logarithms to solve applications. (SLO 1)
12. Solve applications involving growth/decay. (SLO 1)

Module 6: Mathematics of Finance

The student will be able to:

1. Compute simple interest. (SLO 2)
2. Calculate the total amount due on a loan using simple interest. (SLO 2)
3. Compute the future value using compound interest. (SLO 2)
4. Compute the present value using compound interest. (SLO 2)
5. Calculate the effective rate. (SLO 2)
6. Compute the growth time of an investment. (SLO 2)
7. Compute the future value of an ordinary annuity. (SLO 2)
8. Compute the present value of an ordinary annuity. (SLO 2)
9. Compute the regular payments necessary to amortize a loan. (SLO 2)
10. Create an amortization schedule. (SLO 2)

Module 7: Introduction to Probability

The student will be able to:

1. Compute the probability of a single event occurrence. (SLO 4, 5)
2. Construct a sample space for a probability experiment. (SLO 4, 5)
3. Compute the probability of the intersection, union, and complement of events. (SLO 4, 5)
4. Distinguish between mutually exclusive and non-mutually exclusive events. (SLO 4, 5)
5. Compute the expected value of an experiment. (SLO 4, 5)