COURSE NUMBER: MATH 1324

COURSE TITLE: Mathematics for Business & Social Sciences

CREDIT HOURS: 3 LECTURE HOURS: 3 LAB HOURS: 1

ASSESSMENTS: Prior to enrolling in this course, the student must demonstrate eligibility to enroll in the following: MATH 1314, MATH 1324, MATH 1342, or higher.

PREREQUISITE: Meet TSI college-readiness standard for Mathematics; or equivalent.

COREQUISITE: None

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.


SUPPLIES: Graphing calculator required

STUDENT LEARNING OUTCOMES:

State-mandated Outcomes: Upon successful completion of this course, students will:

1. Apply elementary functions, including linear, quadratic, polynomial, rational, logarithmic, and exponential functions to solving real-world problems. (Critical Thinking, Communication Skills)
2. Solve mathematics of finance problems, including the computation of interest, annuities, and amortization of loans. (Critical Thinking, Empirical/Quantitative Skills)
3. Apply basic matrix operations, including linear programming methods, to solve application problems. (Critical Thinking, Communication Skills)
4. Demonstrate fundamental probability techniques and application of those techniques, including expected value, to solve problems. (Critical Thinking, Empirical/Quantitative Skills)
5. Apply matrix skills and probability analyses to model applications to solve real-world problems.
COURSE REQUIREMENTS: Attending lectures, completing assignments, completing required exams and labs, and knowledge of calculator use are all required.

COURSE FORMAT: Lecture, lab and guided practice.

METHOD OF EVALUATION: A minimum of four proctored exams, a lab component grade, and a proctored comprehensive final exam will be given. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor’s addendum to this syllabus. All out-of-class course credit, including home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student’s grade must consist of proctored exams, and no student may retake any of these exams.

LAB STATEMENT: Labs are opportunities for students to apply the concepts taught in class. They fulfill the course’s learning outcomes while assessing the core objectives skills of critical thinking, communication, and empirical/quantitative analysis. The lab assignments must be completed outside of class and labs will be graded and recorded as part of the grading process. Lab credits should count for 10% - 25% of the overall course grade.

ATTENDANCE POLICY: Attendance is expected of all students. If a student is unable to attend, it is his/her responsibility to contact the instructor to obtain assignments. Please see the schedule of classes for the last day to withdraw from the course with a grade of W.

RELIGIOUS HOLY DAYS: In accordance with section 51.911 of the Texas Education Code, the college will allow a student who is absent from class for the observance of a religious holy day to take an examination or complete an assignment scheduled for that day within a reasonable time. A copy of the state rules and procedures regarding holy days and the form for notification of absence from each class under this provision are available from the Admissions and Records Office. Please refer to the current Collin Student Handbook.

ADA STATEMENT: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS Office, SCC-D140 or 972.881.5898, (V/TDD 972.881.5950) to arrange for appropriate accommodations. See the current Collin student Handbook for additional information.

ACADEMIC ETHICS: Please see section 7-2.2 of the Collin Student Handbook. Contact the Dean of Students at 972.881.5771 for the student disciplinary process and procedures.

COURSE CONTENT: Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definition 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. Find the domains of certain functions.
2. Use function notation.
3. Graph linear functions.
4. Graph a line, given its slope and y-intercept or its slope and one point on the line.
5. Write the equation of a line, given information about its graph.
6. Use a graphing calculator to graph functions.
7. Solve a system of linear equations using substitution and elimination.
8. Find the cost function, price-demand function, revenue function, or profit function.
9. Given a revenue function and a cost function, or a profit function, find the break-even point.
10. Given a price-demand function and a price-supply function, find the equilibrium point.

MODULE 2: Special Functions

The student will be able to:

1. Solve a quadratic equation.
2. Find the vertex of the graph of a quadratic function.
3. Determine whether a vertex is a maximum point or a minimum point.
4. Find the zeros of a quadratic function.
5. Graph quadratic functions.
6. Determine the range of a quadratic function.
7. Given a revenue function and a cost function, or a profit function, find the break-even point.
8. Given a price-demand function and a price-supply function, find the equilibrium point.
9. Maximize revenue or profit, and minimize cost.
10. Plot the basic functions (Identity, Constant, Power, and Root).
11. Plot the basic functions using transformations (vertical and horizontal).
12. Given the degree of a polynomial function determine the maximum and minimum number of turning points.
13. Use the graphing calculator to graph a polynomial function.
14. Use the graphing calculator to approximate the real zeros of a polynomial function.
15. Given a rational function determine the domain.
16. Given a rational function determine any vertical or horizontal asymptotes.
17. Use polynomial or rational functions to solve applications problems.
18. Graph piece-wise defined functions.
19. Use the graphing calculator to find the regression line of given data.
20. Plot the regression line with the given data.

MODULE 3: Matrices

The student will be able to:

1. Add and subtract matrices.
2. Organize and interpret data stored in matrices.
3. Multiply a matrix by a scalar.
4. Multiply two matrices.
5. Use matrices to solve systems of equations with unique solutions.
6. Use matrices to solve systems of equations with non-unique solutions.
7. Find the inverse of a square matrix.
8. Use inverse matrices to solve systems of linear equations.
9. Interpret Leontif technology matrices. (Optional)
10. Use Leontif models to solve input-output problems. (Optional)

MODULE 4: Inequalities and Linear Programming

The student will be able to:

1. Graph and solve linear inequalities in one variable.
2. Graph and solve linear inequalities in two variables.
3. Solve systems of linear inequalities in two variables.
4. Use graphical methods to find the optimum value of a linear function subject to constraints.
5. Use the simplex method to maximize functions subject to constraints.

MODULE 5: Exponential and Logarithmic Functions

The student will be able to:

1. Graph a basic exponential function.
2. Graph base $e$ exponential functions.
3. Define the logarithmic functions as the inverse of an exponential function.
4. Write a log function in exponential form and vice-versa.
5. Graph a basic logarithmic function.
6. Use the properties of log functions to simplify log expressions and solve log equations.
7. Use the calculator to find common logs and natural logs.
8. Use logarithms to solve exponential equations.
9. Use logarithms to solve application problems.
10. Solve application problems involving growth/decay.

MODULE 6: Mathematics of Finance

The student will be able to:

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

The student will be able to:

1. Compute the probability of a single event occurrence.
2. Construct a sample space for a probability experiment.
3. Compute the probability that one or the other of two mutually exclusive events will occur.
4. Compute the probability that one or the other of two non-mutually exclusive events will occur.
5. Compute the expected value of an experiment.