

MAT	146	Math for Liberal Arts	3
Dept. Abbr.	Course No.	Course Title	Credits

Course Description

This is a survey course designed to acquaint the student with mathematical ideas not normally encountered at the pre-college level. The course conveys something about the nature of mathematics – its methods, uses, and roles in society – through an elementary introduction to topics such as: Functions, Art in Mathematics, Logic, Number Theory, Computer Science, Statistics, Probability Theory, Graph Theory. *Prerequisite:* Eligible for ENG*101 and MAT*137 (or higher) with a grade of “C” or better OR eligible for ENG*101 and math placement.

General Objectives of the Course

After completing this course, the student will be able to:

- Apply quantitative methods and a variety of problem solving techniques to solve both traditional problems and real-world applications; and analyze/evaluate the results to determine reasonableness.
- Represent mathematical content symbolically, graphically or numerically.
- Evaluate reasoning processes and identify different types of arguments.
- Recognize the role of patterns and inductive reasoning in mathematics.
- Understand and appreciate the nature of mathematics and its roles in the world around us.
- Provide clear, logical and organized explanations through verbal and written responses.

General Education Competencies

Students in this course will:

- Quantitative Reasoning (D)
 - (1) Represent mathematical and quantitative information symbolically, graphically, numerically, and verbally.
 - (2) Apply quantitative methods to investigate routine and novel problems. This includes calculations, procedures, mathematical and /or statistical modeling, prediction, and evaluation.
 - (3) Interpret mathematical and quantitative information and draw logical inferences from Representations such as formulas, equations, graphs, tables and schematics
 - (4) Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness.

- Critical Analysis and Logical Thinking (E)
 - 1) Identifying arguments: Identify issues, evidence, and reasoning process; distinguish facts from opinion; recognize various types of arguments
 - 2) Formulating arguments: Formulates good arguments, including a significant focus on inductive reasoning.
 - 3) Analysis: Break subject matter into components and identify their interactions to ascertain the defining features of the work and their contributions to the whole.
 - 4) Evaluation: Identify assumptions, assessing the quality and reliability of sources of evidence, and demonstrating knowledge of the criteria for evaluating the success of each kind of inference.
 - 5) Synthesis: Draw together disparate claims into a coherent whole in order to arrive at well-reasoned and well-supported inferences that can be justified as a conclusion.

- Written Communication (E)
 - (3) Craft Logical Arguments
 - Generate a controlling idea or thesis
 - Provide clear and logical evidence, support, or illustration for their assertions
 - Choose appropriate and effective organizing methods, employing effective transitions and signposts.

Unit No	Instructional Unit	Specific Objectives of Instructional Unit (The specific objectives reflect the behavioral outcomes, which include what the student will be able to do at the completion of the unit. Evaluation is then to be based on the student's accomplishment of these objectives. Assume that each statement is prefixed with "The student will be able to".)
1	Critical Thinking Skills	<ul style="list-style-type: none"> • Inductive Reasoning • Estimation • Problem Solving
2	Sets	<ul style="list-style-type: none"> • Sets Concepts • Subsets • Venn Diagrams & Set Operations • Venn Diagrams w/3 Sets & Verification of Equality of Sets • Applications of Sets • Infinite Sets
3	Logic	<ul style="list-style-type: none"> • Statements and Logical Connectives • Truth Tables for Negation, Conjunction & Disjunction • Truth Tables for the Conditional and Biconditional • Equivalent Statements • Symbolic Arguments • Euler Diagrams and Syllogistic Arguments
4	Systems of Numeration	<ul style="list-style-type: none"> • Additive, Multiplicative, and Ciphred Systems of Numeration • Place-Value or Positional-Value Numeration Systems • Other Bases • Computation in Other Bases • Early Computational Methods
5	Number Theory and The Real Number System	<ul style="list-style-type: none"> • Number Theory • The Integers • The Rational Numbers • The Irrational Numbers and the Real Number System • Real Numbers and Their Properties • Rules of Exponents and Scientific Notation • Arithmetic and Geometric Sequences • Fibonacci Sequence
6	Systems of Linear Equations and Inequalities	<ul style="list-style-type: none"> • Systems of Linear Equations • Solving Systems of Equations by the Substitution and Addition Methods • Matrices • Solving Systems of Equations by Using Matrices • Systems of Linear Inequalities • Linear Programming

7	The Metric System	<ul style="list-style-type: none"> • Basic Terms and Conversions within the Metric System • Length, Area, & Volume • Mass and Temperature • Dimensional Analysis and Conversions to and from the Metric System
8	Geometry	<ul style="list-style-type: none"> • Points, Lines, and Angles • Polygons • Perimeter and Area • Volume • Transformational Geometry, Symmetry, and Tessellations • The Mobius Strip, Klein Bottle, and Maps • Non-Euclidean Geometry and Fractal Geometry
9	Mathematical Systems	<ul style="list-style-type: none"> • Groups • Finite Mathematical Systems • Modular Arithmetic
10	Consumer Mathematics	<ul style="list-style-type: none"> • Percent • Personal Loans and Simple Interest • Compound Interest • Installment Buying • Buying a House with a Mortgage
11	Probability	<ul style="list-style-type: none"> • The Nature of Probability • Theoretical Probability • Odds • Expected Value (Expectation) • Tree Diagrams • <i>Or</i> and <i>And</i> Problems • Conditional Probability • The Counting Principle and Permutations • Combinations • Solving Probability Problems by Using Combinations • Binomial Probability Formula
12	Statistics	<ul style="list-style-type: none"> • Sampling Techniques • The Misuses of Statistics • Frequency Distributions • Statistical Graphs • Measures of Central Tendency • Measures of Dispersion • The Normal Curve • Linear Correlation and Regression
13	Graph Theory	<ul style="list-style-type: none"> • Graphs, Paths, and Circuits • Euler Paths and Euler Circuits • Hamilton Paths and Hamilton Circuits • Trees

14	Voting and Apportionment	<ul style="list-style-type: none">• Voting Methods• Flaws of Voting• Apportionment Methods• Flaws of Apportionment Methods