

Math 115

Mathematics for Business and Social Sciences

Advising:

This core course is a **requirement** for **Business Management majors** and **Economics majors**, and should be taken early in their program (freshman or sophomore year).

It is also an excellent course for students with majors or minors in the **social sciences**, since it introduces **quantitative methods** useful in these fields. For this reason, it would also be helpful for students planning to go on to **graduate school** in almost any field of study.

For **Liberal Studies majors**, Math 115 is an approved and recommended course for the mathematics concentration. It can also be used to satisfy credit requirements towards the **mathematics minor**.

Math 115 is an **algebra – intensive** mathematics core course, and therefore appropriate for any student looking for an applied algebra experience. However, for students who are just looking to satisfy their mathematics core requirement and have no specific requirement or recommendation from their major, **Math 110 and/or Math 111 may be more appropriate choices**.

Catalog Description:

An introduction to algebraic modeling, with an emphasis on applications in business and the social sciences. Topics include: using algebraic models to describe the relationship between variables, using graphs to visualize models, and choosing and interpreting various models. Calculus is introduced and is used as a tool for studying the structure of algebraic models. Prerequisite: High School Algebra II or Math 103.

Course Objectives:

Algebraic methods are utilized and integrated with realistic situations, with the majority of examples coming from business applications. Students will learn how to construct algebraic models, and how the tools of algebra and calculus can be used to understand and interpret these models. Students will develop both analytic and graphical methods of description and communication. Algebraic concepts and methods developed include: constructing and interpreting functions and graphs; constructing and solving linear and quadratic equations and models; understanding and applying linear model methodology such as linear regression and/or linear programming; understanding and producing the derivative function; and applying the derivative function to curve sketching and optimization problems.

Instructional Objectives:

The student will understand/know how to:

1. manipulate fractions, percents, and exponents.
2. evaluate algebraic expressions.
3. solve linear equations.
4. solve quadratic equations using the quadratic formula.
5. (optional) solve quadratic equations using factoring.
6. (optional) solve linear and quadratic inequalities in one variable.
7. (optional) solve simple rational equations.
8. solve equations for a given variable (“formulas”)
9. translate realistic problems into algebraic models.
10. determine when a given situation can be modeled using a linear equation.
11. fit a linear model to data.
12. interpret the parameters of a linear model (slope, y–intercept).
13. graph a linear model.
14. interpret the graph of a linear model (slope, y–intercept, x–intercept).
15. graph a system of linear equations.
16. applications of fixed cost, variable cost, and selling price.
17. applications of cost functions, revenue functions, and profit functions.
18. (optional) applications of supply and demand functions.
19. basic methodology and application of linear programming and/or linear regression.
20. the theory and notation of functions.
21. the derivative function.
22. (optional) what differentiation tells us about rates of change.
23. produce the derivative function from a given function (using the rules of differentiation: constant rule, power rule, constant multiple rule, sum rule).
24. graph quadratic functions.
25. applications of the quadratic function.
26. graph higher – order polynomial functions using the derivative function.
27. use differentiation to solve optimization problems.
28. (optional) interpret and perform marginal analysis.

Core Status: Math 115 is a core mathematics course satisfying the “Traditional Mathematics” sub–area. It satisfies these areas in the following ways (from the 1997 Core Inclusion Form):

COURSE OBJECTIVES

1. Recognize, understand, utilize, integrate and communicate mathematical concepts, mathematical methods and logical reasoning.

Algebraic methods are utilized and integrated with realistic situations from business and the social sciences. Students will learn how to construct algebraic models, and how the tools of algebra and calculus can be used to understand and interpret these models. Students will develop both analytical and graphical methods of description and communication.

2. Apply mathematical concepts, mathematical methods, and mathematical reasoning within an analytic framework.

Students will apply the following mathematical concepts, methods, and reasoning: functions; graphs; constructing and solving linear and quadratic equations; linear models; quadratic models; finding equivalent algebraic expressions; and producing, understanding, and applying the derivative function.

3. Conceptualize and utilize algorithms and formal mathematical structures.

Algorithms used in this course include simplifying and reducing algebraic expressions, solving linear equations, solving quadratic equations by factoring and by the quadratic formula, computing solutions for linear model applications such as linear regression or linear programming, and applying the rules of differentiation.

COURSE REQUIREMENTS

1. Introduce traditional mathematical concepts, constructs, systems, algorithms, and methods of inquiry and analysis.

The concepts, constructs, systems, algorithms, and methods of inquiry and analysis of a traditional algebra class and calculus class are reviewed and applied.

2. Provide an environment where students can construct, investigate, learn, and/or apply those attributes described in Course Requirement 1.

Classroom lecture and discussion, group work, projects and presentations are combined to create a learning environment.