



September 2009

MATH 118 Pre-Calculus Algebra

1. Catalog Description

MATH 118 Pre-Calculus Algebra (4)

GE B1

Pre-calculus algebra without trigonometry. Special products and factoring, exponents and radicals. Fractional and polynomial equations. Matrices, determinants, and systems of equations. Polynomial, rational, exponential, and logarithmic functions. Graphing, inequalities, absolute value, and complex numbers. MATH 118 is equivalent to MATH 116 and MATH 117. Not open to students with credit in MATH 117. 4 lectures. Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement examination.

2. Required Background or Experience

The ability to perform all of the routine algebraic operations with accuracy and confidence.

3. Learning Objectives

The student should be able to:

- a. Use and understand the language and notation of the algebra of functions.
- b. Use and understand the basic properties of the elementary functions: polynomials, rational, exponential, and logarithmic.
- c. Use and understand the basic algebraic principles of graphing.
- d. Solve linear and quadratic equations and inequalities.
- e. Perform arithmetic operations with complex numbers.
- f. Perform the basic operations with matrices and determinants.
- g. Solve systems ($n < 4$) of linear equations using matrices and determinants.

4. Text and References

Cohen, David, et al., Precalculus: A Problems-Oriented Approach, 6th ed., Thomson/Brooks-Cole, 2005.

5. Minimum Student Materials

Paper, pencils, and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

<u>Topic</u>	<u>Lectures</u>
Chapter 1: Fundamentals	3
1.1 Sets of Real Numbers	
1.2 Absolute Value	
1.3 Solving Equations (Review and Preview)	
1.4 Rectangular Coordinates. Visualizing Data	
1.5 Graphs and Graphing Utilities	
1.6 Equations of Lines	
1.7 Symmetry and Graphs. Circles	
Chapter 2: Equations and Inequalities	3
2.1 Quadratic Equations: Theory and Examples	
2.2 Other Types of Equations	
2.3 Inequalities	
2.4 More on Inequalities	
Chapter 3: Functions	5
3.1 The Definition of a Function	
3.2 The Graph of a Function	
3.3 Shapes of Graphs. Average Rate of Change	
3.4 Techniques in Graphing	
3.5 Methods of Combining Functions (<i>Skip iteration</i>)	
3.6 Inverse Functions	
Chapter 4: Polynomial and Rational Functions: Applications to Optimization	4
4.1 Linear Functions	
4.2 Quadratic Functions	
4.4 Setting Up Equations That Define Functions	
4.5 Maximum and Minimum Problems	
Chapter 12: Roots of Polynomial Equations	4
12.1 The Complex Number System	
12.2 Division of Polynomials	
12.3 The Remainder Theorem and the Factor Theorem	
12.4 The Fundamental Theorem of Algebra	
12.5 Rational and Irrational Roots (<i>optional</i>)	
12.6 Conjugate Roots and Descartes's Rule of Signs (<i>Descartes's Rule optional</i>)	
12.7 Introduction to Partial Fractions (<i>optional</i>)	
12.8 More About Partial Fractions (<i>optional</i>)	
Chapter 4: Polynomial and Rational Functions: Applications to Optimization	3
4.6 Polynomial Functions	
4.7 Rational Functions	
Chapter 5: Exponential and Logarithmic Functions	7
5.1 Exponential Functions	
5.2 The Exponential Function $y = e^x$	
5.3 Logarithmic Functions	
5.4 Properties of Logarithms	
5.5 Equations and Inequalities with Logs and Exponents	
5.6 Compound Interest	
5.7 Exponential Growth and Decay	
Chapter 10: Systems of Equations	5
10.1 Systems of Two Linear Equations in Two Unknowns	
10.2 Gaussian Elimination	
10.3 Matrices	
10.4 The Inverse of a Square Matrix (<i>optional</i>)	
10.5 Determinants and Cramer's Rule	
10.6 Nonlinear Systems of Equations (<i>optional</i>)	
10.7 Systems of Inequalities (<i>optional</i>)	

Total

34

8. Methods of Assessment

The primary methods of assessment are, in decreasing order of importance: essay examinations, quizzes and homework. Typically, there will be two or three hour-long examinations during the quarter, and a comprehensive final examination. Students are required to show their work, and are graded not only on the correctness of their answers, but also on their understanding of the concepts and techniques. Quizzes are usually given once or twice a week to provide a spot check of student learning. Homework is required daily. Since this class satisfies a General Education requirement, at least 10% of the grade must be based on writing using correct mathematical notation.

9. Additional Comments

- a. The syllabus is tightly packed, and the course moves at a rapid pace; students should be forewarned of this at the first class meeting. Students finding difficulty with the pace should instead take Math 116 followed by Math 117.
- b. The text has many interesting applications. Also note the review sections at the end of each chapter.
- c. The text is readable; students should be advised to read each section *before* coming to class.
- d. The text is bundled with an interactive Video Skill-Builder CD-ROM.
- e. Additional supplements (test banks, Instructor's Resource CD, etc.) are available from the course supervisor.