

MATH 118 PreCalculus Algebra

1. Catalog Description

MATH 118. Precalculus Algebra

4 units

GE Area B1

Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination.

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, MATH 141, MATH 161, or MATH 221. Credit will be granted in only one of the following courses: MATH 116, MATH 118. 4 lectures. Fulfills GE B1; for students admitted Fall 2016 or later, a grade of C- or better in one GE B1 course is required to fulfill GE Area B.

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, customized for Cal Poly, Thomson/Brooks-Cole.

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 13: Roots of Polynomial Equations	4
13.1 Division of Polynomials	
13.2 The Remainder Theorem and the Factor Theorem	
13.3 The Fundamental Theorem of Algebra	
13.4 Rational and Irrational Roots (<i>optional</i>)	
13.5 Conjugate Roots and Descartes's Rule of Signs (<i>Descartes's Rule optional</i>)	
13.6 Introduction to Partial Fractions (<i>optional</i>)	
13.7 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 11: Systems of Equations	5
11.1 Systems of Two Linear Equations in Two Unknowns	
11.2 Gaussian Elimination	
11.3 Matrices	
11.4 The Inverse of a Square Matrix (<i>optional</i>)	
11.5 Determinants and Cramer's Rule	
11.6 Nonlinear Systems of Equations (<i>optional</i>)	
11.7 Systems of Inequalities (<i>optional</i>)	
Total	34

8. Methods of Assessment

The primary methods of assessment are 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. Homework is required daily.