

Office of Academic Affairs
Tarleton State University

Master Course Syllabus Outline

Department: Mathematics, Physics, & Engineering

Course Prefix/Number: MAED 530

Official Course Title: Teaching and Learning Precalculus

Master Syllabus Approved by Department on: 10/1/2007

I. Catalog Description (50 words; brief synopsis of course content, emphases)

This course is designed to extend teachers' understanding of the foundational concepts developed in precalculus. The course begins by developing foundations for functions and exploring functions as a unifying theme. These concepts include foundations of functions, transformations, exponential and logarithmic functions, and power functions and polynomials. Matrices, linear programming, quadratic and square root functions, rational functions, and conic sections will also be developed.

II. Prerequisites?

Math 120 or equivalent

III. Expanded Course Description (150 words; primary course content, intended student level and role(s) course is to play in the curriculum.

Specific topics include:

- I. Systems
 1. Matrices
 2. Linear Programming
- II. Quadratic and Square Root Functions
- III. Rational Functions
- IV. Conic Sections
- V. Polynomial Functions
- VI. Rational Functions
- VII. Trigonometric Forms and Periodic Functions
- VIII. Parametric Equations
- IX. Sequences and Series

This course is designed to stretch and extend mathematical knowledge by exploring functions and concepts addressed in the typical high school Precalculus course. The activities in this course are designed for teachers and extend well beyond what might typically be taught in the Precalculus classroom.

Components of course activities will include:

- Multiple representations (verbal, concrete, pictorial, tabular, symbolic, graphical)
Mathematical ideas will be represented in many different formats. This helps both teachers and students understand mathematical relationships in different ways.
- Integration of manipulative materials and graphing technology
The emphasis is on mathematics, not on learning about particular manipulative materials or calculator keystrokes. However, such tools are used in various ways throughout the course.
- Rich Connections within and outside mathematics
The course focuses on using important mathematical ideas to connect various mathematical topics and on making connections to content areas and applications outside of mathematics.

- Questioning strategies

A variety of questions are developed within each activity that help elicit deep levels of mathematical understanding and proficiency.

- Hands-on approach with “get-up-and-move” activities

The course is designed to balance intense thinking with hands-on experiences.

IV. Intended Student Learning Outcomes? Required; **knowledge outcomes** (what students who successfully complete the course will be expected to know). Optional; **skill outcomes** (what students who successfully complete the course will be able to do). Optional; **value outcomes** (what students who successfully complete the course will value or appreciate).

Knowledge Outcomes:

Upon completion of this course, the student will be expected to:

1. Understand the mathematical concepts within the content.
2. Understand the learning theory and pedagogy related to the content.
3. Make informed decisions about choices of activities and assessment.
4. Use technology appropriate to the content.

And, as recommended by the National Council of Teachers of Mathematics (NCTM) in the Principles and Standards for School Mathematics (2000),

5. Problem Solving:

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

6. Reasoning and Proof:

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

7. Communication:

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

8. Connections:

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

9. Representation:

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

V. Unless otherwise stipulated in this master syllabus by the department, the following items are subject to faculty discretion as described in each faculty member's individual course outline/syllabus:

a) Course Requirements? (grading/evaluation procedures; class attendance policy; term papers, projects, field assignments; examinations; class participation, etc.)

b) Required Text(s)?

c) Bibliography?

Department Head Signature/Date:

_____/_____/_____