

Office of Academic Affairs
Tarleton State University

Master Course Syllabus Outline

Department: Mathematics, Physics, & Engineering

Course Prefix/Number: MAED 550

Official Course Title: In-depth Secondary Mathematics

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

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

In this course, teachers study and reflect on the depth and richness of actual concepts and problems of high school mathematics courses. Ideas from algebra, geometry, and trigonometry are integrated in the analysis of a small number of particular problem situations to show what it means to treat them in a deep and general way. The focus will be on mathematical content of algebra, geometry, and functions as well as mathematical habits of mind.

II. Prerequisites?

MAED 530 or department head approval

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

This course consists of analyses of problems and concepts that illustrate a deep understanding of high school mathematics. Learning how to analyze problems in this way is a potentially very helpful component of the mathematical preparation and in-service of high school teachers.

These analyses involve treating ordinary high school problems in a mathematically very sophisticated way that does not involve "higher level" mathematics.

a. The problems that serve as the starting point of these analyses are standard high school problems. They are not particularly difficult problems, and involve what most people familiar with high school programs would regard as central, core ideas of high school mathematics.

b. The analyses of the problems that are illustrated here involve considerably more mathematical depth than the treatment typically given in high school. They generalize and extend the problems in a way that most mathematicians would regard as sophisticated, mature, and pleasing mathematically. Moreover, the results of the analyses are often themselves interesting mathematically.

c. The mathematical sophistication of the analyses does not rely on higher level mathematics. In particular, it does not utilize the sorts of material, typically studied in undergraduate courses in mathematics that extends the ideas of high school mathematics and gives them a theoretical foundation. Rather, the sophistication comes from using the tools and concepts of high school mathematics themselves, but in a mathematically more thorough, sustained, and reflective manner.

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:

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