# Mathematics Modeling for Middle School Teachers
## Math 361 - Fall 2014

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| COURSE INFORMATION |
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**Text:**

**CALCULUS CONNECTIONS**
**Author:** HARCHARRAS and MITREA
**ISBN:** 9780131449230
**Edition/Copyright:** 07
**Published Date:** 2007

**Necessary Materials:**  A calculator – graphing

**Course Content:**

The goal of this course is to develop *understanding* of the mathematics.  We are constantly going to be dealing with *WHY* more than *HOW*.  As a future teacher you must be able to *explain* mathematics to your students, not just show them how to carry out mathematical procedures.  We will focus on underlying structures and development of ideas.  In addition, problem solving is a major component of this course.  As a future mathematics teacher, you need to become familiar with and skilled in various types of problem solving techniques that are commonly used in mathematical thinking.

 Modeling is a process that involves using mathematical concepts, functions, and structures to describe and explain real world phenomena or situations.  In this course we will cover reasoning, recursive thinking, and regression.  Mathematical topics will include bivariate data analysis, linear relationships, and sequential use of linear and exponential models.

**Course Description:**

Mathematics will serve as the basis of the course and the following topics will be covered: Mathematical modeling, transformation of functions, data analysis skills, linear models, exponential growth and decay, logarithmic functions, logistic models, power and polynomial models, inverse and direct variation, periodic models and trigonometric functions. Prerequisite Math 141.

**Course Competencies and Outcomes:**

**Teachers should understand  functions and relations to model and solve problems.**

The beginning teacher should

1. Use a variety of methods to investigate the roots, vertex and symmetry of a quadratic functions and relations.
2. Demonstrate an understanding of the connections among geometric, graphic, numeric and symbolic representations of quadratic functions.
3. Analyze data and represents and solves problems involving exponential growth and decay.
4. Demonstrate an understanding of the connections among proportions, inverse variation and rational functions
5. Understand the effects of transformations on graphs of nonlinear functions.
6. Apply properties, graphs and applications of nonlinear functions to analyze, model and solve problems
7. Use a variety of representations and methods to solve systems of quadratic equations and inequalities.
8. Understand how to use properties, graphs and applications of non linear relations including polynomial, rational, radical, absolute value, exponential, logarithmic, trigonometric and piecewise functions and relations to analyze, model and solve problems.

**The teacher should use and understand the conceptual foundations of calculus related to topics in middle school mathematics.**

The beginning teacher:

1. Relate topics in middle school math to the concepts of limit in sequences and series.
2. Relate the concept of average rate of change to the slope of the secant line and instantaneous rate of change to the slope of the tangent line
3. Relate topics in middle school math to the area under a curve.
4. Demonstrate an understanding of the use of calculus concepts to answer questions about rates of change, area, volumes and properties of functions and their graphs.

| COURSE REQUIREMENTS |
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**Instructional / Methods / Activities Assessments**

The goal of this course is to develop *understanding* of the mathematics.  We are constantly going to be dealing with *WHY* more than *HOW*.  As a future teacher you must be able to *explain* mathematics to your students, not just show them how to carry out mathematical procedures.  We will focus on underlying structures and development of ideas.  In addition, problem solving is a major component of this course.  As a future mathematics teacher, you need to become familiar with and skilled in various types of problem solving techniques that are commonly used in mathematical thinking.

**Course Grading:**  Will be based on  Research Projects, 3 In-class Exams, and homework.  In order to successfully mathematically prepare today's children for the technological world they face, a middle school teacher must have a solid understanding of a broad spectrum of mathematics, including mathematics at a level considerably beyond the grade he/she teaches.

       Research Projects –   15%
       Homework -           10%
       Exam 1 –            25%
       Exam 2 –            25%
       Exam 3 –            25%

## TECHNOLOGY REQUIREMENTS

Internet access (high-speed preferred)

Word processing software (Microsoft Word preferred)

As a student enrolled at Texas A&M University-Commerce, you have access to an email account via myLeo - all my emails sent from eCollege (and all other university emails) will go to this account, so please be sure to check it regularly. Conversely, you are to email me via the eCollege email system or your myLeo email as our spam filters will catch yahoo, hotmail, etc.

## ACCESS AND NAVIGATION

**Access and Log in Information**
This course will be utilizing eCollege to enhance the learning experience, eCollege is the Learning Management System used by Texas A&M University-Commerce.

You will need your CWID and password to log in to the course. If you do not know your CWID or have forgotten your password, contact Technology Services at 903.468.6000.

Texas A&M University-Commerce provides students technical support in the use of eCollege. The student help desk may be reached by the following means 24 hours a day, seven days a week. If you experience issues while taking your exams or at any other point, feel free to contact the support desk.

 **Phone:** 1-866-656-5511 (Toll Free) to speak with eCollege Technical Support Representative.

• **Email:** helpdesk@online.tamuc.org to initiate a support request with eCollege Technical Support Representative.

• **Help:** Click on the *'Help'* button on the toolbar for information regarding working with eCollege

## COURSE AND UNIVERSITY PROCEDURES/POLICIES

**Attendance**

It is the prerogative of the instructor to drop students from courses in which they have accrued excessive absences (three or more). However, a student wishing to drop the course should do so. Failure to do so may result in a failing grade. Attendance is strongly encouraged for your own benefit.  Any work missed due to your absence is your responsibility and should be made up as soon as possible.  If you should miss a lecture, you should get a copy of someone's notes and then I will answer any questions you have over those notes. Attendance in an online course will be observed by login into the course.  Three weeks without a login will be considered excessive absences.

**Make-ups:**  The opportunity to take a make-up exam can only be expected if you contact the instructor either on or before the day of an exam, make reasonable arrangements at that time, and have an excused absence.

**Cheating:**  Cheating of any kind will result is an F for the term.  All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See Student's Guide Handbook, Policies and Procedures, Conduct)

**Academic Honesty Policy**

Texas A&M University-Commerce does not tolerate **plagiarism** and other forms of academic **dishonesty**. Conduct that violates generally accepted standards of academic honesty is defined as academic dishonesty. "Academic dishonesty" includes, but is not limited to, plagiarism (the appropriation or stealing of the ideas or words of another and passing them off as one's own), cheating on

exams or other course assignments, collusion (the unauthorized collaboration with others in preparing course assignments), and abuse (destruction, defacing, or removal) of resource material.

Disciplinary action for these offenses may include any combination of the following:

1. Point deduction on an assignment.

2. Failure for an assignment.

3. A grade of zero for an assignment.

4. Failure for the course.

5. Referral to the Academic Integrity Committee or department head for further action.

6. Referral to the Dean of the College of Education and Human Services, Business and Technology, Arts and Sciences, or Graduate School as appropriate.

7. Referral to the University Discipline Committee.

8. Communication of student's behavior to the Teacher Certification Office and/or Dean of the College of Education as constituting a reason to bar student from entering into or continuing in a teacher certification program. Procedures, A 13.04, 13.12, 13.31, and 13.32

### *ADA Statement*

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities.  If you have a disability requiring an accommodation, please contact:

**Office of Student Disability Resources and Services**
**Texas A&M University-Commerce**
**Gee Library 132**
**Phone (903) 886-5150 or (903) 886-5835**
**Fax (903) 468-8148**
StudentDisabilityServices@tamu-commerce.edu
Student Disability Resources & Services

### COURSE OUTLINE / CALENDAR

The course calendar will be given the first day of class.