

MAT3930
Functions and Modeling (FSU-Teach)
Tues/Thurs 9:30 – 10:45, MCH 220
Course Syllabus

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Course Prerequisite(s):

- Successful completion of Step 2 Mathematics Course
- MAC 2311, Calculus with Analytic Geometry I, or the equivalent, or permission of instructor
- An interest in exploring teaching

Course Description/Overview

The purpose of this course is to deepen and broaden your mathematical knowledge, with an emphasis on concepts connected to secondary mathematics.

You will engage in explorations and lab activities designed to strengthen and expand your mathematical knowledge. Course activities are designed to guide you to a second, deeper look at topics you should have been exposed to previously; illuminate the connections between secondary and college mathematics; illustrate good use of technology in teaching; illuminate the connections between various areas of mathematics; and engage you in serious (i.e., non-routine) problem solving, in problem-based learning, and in applications of mathematics.

The course consists of four units: 1) Functions, 2) Modeling, 3) Overlooked Topics and Explorations, and 4) Geometry of Complex Numbers. Specific topics of investigation include function properties and patterns, complex numbers, parametric equations, polar equations, vectors, and exponential growth and decay. Explorations involve the use of multiple representations, transformations, data analysis techniques (such as curve fitting) and interconnections among topics in algebra, analytic geometry, statistics, trigonometry, and calculus. The lab investigations include use of various technologies including computers, calculators, and computer graphing software.

Course Objectives and Expectations

Course Objectives and Evidence of Student Learning	
<i>Students will be able to...</i>	<i>Evidence of Student Learning:</i>
demonstrate proficiency in working with the concept of function and function related topics such as rate of change, limit, and accumulation.	<ul style="list-style-type: none"> classroom activities, student presentation of findings, assessments, and classroom performance
demonstrate a depth of content knowledge with regard to important secondary mathematics topics such as parametric relations, polar relations, matrices, exponential and logarithmic functions, vectors, and complex numbers.	<ul style="list-style-type: none"> classroom activities, student presentation of findings, assessments, and classroom performance
generate or work with relevant lab or exploration data and use regression, matrix, function pattern, and other methods to generate and model the data.	<ul style="list-style-type: none"> classroom activities and classroom lab write up
present mathematical ideas and topics in a knowledgeable and effective manner.	<ul style="list-style-type: none"> classroom presentations of findings and classroom performance
demonstrate proficiency in the use of technology in the mathematics classroom.	<ul style="list-style-type: none"> classroom activities, labs, assessments, and classroom performance
identify mathematics content connections between the various levels of secondary mathematics curriculum and between secondary and university level curriculum.	<ul style="list-style-type: none"> classroom activities, student presentation of findings, and classroom performance

Expectations

1. Because a majority of the learning hinges on group work done during class time, **attendance** is of utmost importance. **Two points** will be deducted for each absence. If you contact your instructor before the class begins, only one point will be deducted, unless you have a valid excuse (see below). **One point** will be deducted for each unexcused tardy after the first. If you leave class early or consistently choose not to participate, points will be deducted. NOTE: We reserve the right to lower your grade by one letter or fail you for excessive absences.
2. You are expected to contribute to classroom discussion by conducting extended research of topics outside of the classroom.
3. Use e-mail for communication with the instructor(s) and with mentor teachers who work with you in your secondary school field experiences.
4. Check the course Web site daily for class information and updates.

Course Requirements

Students must be able to:

- Create Microsoft® Word documents or PDF documents
- Check e-mail daily
- Attach documents to e-mail messages
- Check the Blackboard course Web site weekly

NOTE: A TI 83/84+ (or Nspire) calculator is used in some of the labs – each group will need at least one of these.

Tentative Course Schedule

Class	Topic
8/25 Topic 1:	Course Orientation
8/27 Topic 2:	Function Sorting
9/1 Topic 3:	Parabola Roots Exploration
9/3 Topic 4:	Qualitative Graphing
9/8 Topic 5:	Conic Sections
9/10 Topic 6:	Spring Mass Lab
9/15 Topic 7:	Sequences
9/17 Topic 8:	Difference Columns
9/22 Topic 9:	Test #1
9/24 Topic 10:	Function Patterns, Part 1
9/29 Topic 11:	Function Patterns, Part 2
10/1 Topic 12:	Modeling Functions and Linear Regression
10/6 Topic 13:	More Regression and Residuals
10/8 Topic 14:	Test #2
10/13 Topic 15:	Modeling Functions with Matrices, Part 1
10/15 Topic 16:	Terminal Speed Lab
10/20 Topic 17:	Modeling Functions with Matrices, Part 2
10/22 Topic 18:	Parametric Models
10/27 Topic 19:	Parametric Explorations
10/29 Topic 20:	Test #3
11/3 Topic 21:	Polar Coordinate System
11/5 Topic 22:	Exponential/Logistic Models
11/10 Topic 23:	Vector Lab
11/12 Topic 24:	Comprehensive Applications, Part 1
11/17 Topic 25:	Comprehensive Applications, Part 2
11/19 Topic 26:	Test #4
11/24 Topic 27:	Geometry of Complex Numbers
12/1 Topic 28:	Polar Complex Numbers
12/3 Topic 29:	Mandelbrot Set and Wrap-up
12/7, 7:30 – 9:30 am :	Final Exam

Attendance Policy

Daily attendance is essential and required. However, you will be given the opportunity to make-up work missed due to excused absences. An excused absence is one of the following: documented illness of yourself or serious illness of a dependent child; deaths in the immediate family and other documented crises; call to active military duty or jury duty; religious holy days; and official University activities.

Students must provide, when possible, advance notice of absences as well as relevant documentation regarding absences to the instructor as soon as possible following the illness or event that led to an absence. Regardless of whether an absence is excused or unexcused, the student is responsible for making up all work that is missed. University-wide policy requires all students to attend the first class meeting of all classes for which they are registered. Students who do not attend the first class meeting of a course for which they are registered will be dropped from the course by the academic department that offers the course.

For further information, consult the *FSU General Bulletin* at:

<http://registrar.fsu.edu/bulletin/undergrad/apdefault.htm>.

Assignments/Grading Policy

Activities	Points
Tests. There will be four in-class exams to test your knowledge of the concepts we are currently discussing in class	40
Written Assignments, Labs, Homework. There will be frequent in-class and take-home explorations and labs, as well as four graded homework assignments.	30
Attendance, Engagement, and Contributions. Since a majority of this work hinges on group work done during the class time, attendance is of utmost importance and you are expected be in class each and every day	5 (or more; see p. 2)
Midterm Project. You will explore the beauty of mathematics. Details will be given later.	10
Final Exam. On Monday, Dec. 7, 2009, 7:30 – 9:30 am	15
TOTAL	100

Grading Scale

- 90 – 100 = A
- 80 – 89 = B
- 75 – 79 = C
- 70 – 74 = D
- Below 70 = F

Late Work Policy: Assignments must be submitted on the dates indicated on the course outline. Late work will not be accepted unless there is a documented excuse as listed in The Attendance Policy above.

Additional University Policies

Honor Code

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://dof.fsu.edu/honorpolicy.htm>).

ADA Requirements

AMERICANS WITH DISABILITIES ACT:

Students with disabilities needing academic accommodation should:

- (1) register with and provide documentation to the Student Disability Resource Center; and
- (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center
874 Traditions Way
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu
<http://www.disabilitycenter.fsu.edu/>