1 Course Information

1.1 Course Description

This capstone course is designed to prepare secondary mathematics majors for a career in high school teaching. Specifically, I want you to be exposed to a deep study of the mathematics that you will encounter as a high-school teacher. Course topics are specifically chosen so that your students are prepared for the mathematics portion of the Texas College and Career Readiness Standards.

Before getting excited that you will spend a semester on “high school mathematics,” let me assure you that we will discuss these topics from the point of view of a mathematician. That is, we will look for patterns and connections to mathematics courses beyond that which your students will take in high school. So, yes, abstract algebra will be used! The course textbook is Mathematics for Secondary School Teachers by Bremigan, Bremigan, and Lorch, ISBN # 978-0-88385-773-1.

Below is a tentative schedule that lists the sections that will be covered this semester:

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<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td>Jan 14</td>
<td>8.1.6</td>
<td>8.1.1, 8.1.2, 8.1.6</td>
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<tr>
<td>Jan 21</td>
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<td>8.1.3, 8.1.4</td>
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<td>Jan 28</td>
<td>8.1.4, 8.1.5</td>
<td>8.2.3</td>
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<td>Feb 4</td>
<td>8.3.1, 8.4.1, 8.4.2</td>
<td>8.4.3</td>
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<td>Feb 11</td>
<td>Review</td>
<td>Exam 1</td>
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<td>Feb 18</td>
<td>8.4.3</td>
<td>7.6.2</td>
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<tr>
<td>Feb 25</td>
<td>12.4.2, 12.5.2</td>
<td>12.2.2, 12.4.2</td>
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<tr>
<td>Mar 4</td>
<td>12.2.1</td>
<td>12.4.1</td>
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<tr>
<td>Mar 18</td>
<td>Review</td>
<td>Exam 2</td>
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<tr>
<td>Mar 25</td>
<td>Graphing polynomials</td>
<td>8.5.1</td>
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<td>Apr 1</td>
<td>9.1, 9.2, 10.4.2</td>
<td>9.3.2, 9.4.1</td>
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<td>Apr 8</td>
<td>9.5.1, 10.1.1</td>
<td>10.2.1, 10.3.1, 10.3.2</td>
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<td>Apr 15</td>
<td>Review</td>
<td>Exam 3</td>
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<td>Apr 22</td>
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<td>4.5.3, 7.6.4, 11.2.1</td>
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<tr>
<td>Apr 29</td>
<td>11.2, 11.3, 11.4, 11.5</td>
<td>Review</td>
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1.2 Student Learning Outcomes

Upon completion of this course, students will be able to:

- Use the Division Algorithm and the Fundamental Theorem of Arithmetic to prove basic theorems about numbers
- State and prove theorems concerning infinite decimal expansions of fractions
- State and prove theorems from high school algebra (i.e., Factor Theorem, Rational Root Test) for polynomials over various rings.
- Explain various techniques for graphing polynomials and rational functions
- Solve problems involving exponentials, logarithms, and trigonometric functions (both over $\mathbb{R}$ and $\mathbb{C}$).
- Use advanced knowledge of mathematics to answer real questions posed by high-school students.

2 Course Requirements

2.1 Exams (50%)

There will be three exams and a cumulative final given during the semester. Tentatively, the exams are scheduled for the following days:

- Exam 1: Wednesday, February 13 (in class)
- Exam 2: Wednesday, March 20 (in class)
- Exam 3: Wednesday, April 17 (in class)
- Final Exam: Wednesday, May 8 (1:15-3:15 pm)

2.2 Homework problems from lecture (30%)

Specific problems from the text will be assigned weekly. You are to complete each problem to the best of your ability. I will not grade every problem every week; rather, I will grade a representative sample of the problems. I do encourage you to collaborate on these problems. However, any work submitted must be your own work and not copied from someone else. Please attribute novel ideas to their original source.

2.3 Daily Problem Journal (20%)

At the beginning of the semester, I will post (on my website) a large collection of hard problems from real high school students. Throughout the semester, you will be recording solutions/answers to these problems in a journal. The point is to help you decide how you would answer these questions if posed by a future high school student. With this journal writing, you will develop two important skills: (1) solidifying your content knowledge of secondary mathematics, and (2) learning how to “sell” difficult ideas to your future students. Journals will be collected and graded at pseudo-random times throughout the semester. As such, it is VERY important that you work on these problems regularly. Ideally, you will answer ALL problems by the end of the semester.
3 Communication and Support

- Each student is encouraged to contact the professor for assistance with any class-related problem.
- Use email to facilitate speedy communication between student and professor. Please keep in mind your instructor’s posted office hours.
- Students’ grades and concerns are very important! To discuss grades or concerns contact the professor during office hours.
- Students are responsible for all course announcements, either in class or distributed by email.

4 Course and University Procedures and Policies

4.1 Course-specific Policies

4.1.1 Academic Honesty

Texas A&M University - Commerce has explicit rules and regulations governing academic dishonesty and academic misconduct. As the University states, “All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment.” These policies are stated in detail in the Students Guide Handbook. Each student is expected to read the documents at the address and abide by the contained policies. These university policies will be followed in this class. The minimum penalty for an act of academic dishonesty will be the assignment of a grade of 0 on the examination or assignment.

4.1.2 Attendance Policy

Class attendance is mandatory. Every student is expected to take a seat at or before 4:00 pm and actively participate in all class discussions. Any student arriving late to (or completely missing) four or more class sessions may be penalized one letter grade.

4.1.3 Assignment Policy

All assigned work must be turned in at the beginning of class on the day it is due. No late assignments will be accepted.

4.1.4 Policy for Assignment of an Incomplete Grade

A grade of Incomplete is reserved for only those special cases where a student has completed a significant portion of the semesters work and an unavoidable circumstance prevents him or her from completing the course. If you have any questions, please contact the instructor.
4.2 University Policies

4.2.1 Accommodations for Students with Disabilities

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, Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamu-commerce.edu

4.2.2 Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See Code of Student Conduct from Students Guide Handbook)

Any changes to this syllabus will be communicated to you in class by the instructor.