Course Content and Goals

This course focuses on topics from discrete mathematics, including: combinations, permutations, graph theory, and linear algebra. These topics represent oft-neglected aspects of the secondary school curriculum that can be used to engage students in solving real-world problems. Course activities will emphasize the curricular themes of problem solving, reasoning and proof, communication, connections, and representation. MATH 3034 is a prerequisite for this course.

The goals of the course are:
1) To challenge you to learn discrete mathematics and apply it to realistic problem solving
2) To focus on important mathematical processes, such as communication, connections, problem solving, reasoning & proof, and representation
3) To experience mathematics teaching and learning using secondary school reform curricula
4) To learn to pose challenging mathematical tasks that promote mathematical engagement and conceptual development

Course Format

Class meetings will frequently involve working in small groups on challenging problems, presenting your progress on these problems, and providing others with questions and comments on their presentations. Additionally, a significant portion of our class time will be spent designing tasks for high school students and assessing their responses to these tasks. There will also be one teaching project that you complete as a small group.

It is your responsibility as a learner and as a member of this class to be engaged in participation, rather than being just a passive observer or note-taker. In addition to working together in class, you are encouraged to find study partners or to form study groups outside of class.

Any student who feels that he or she may need an accommodation because of a disability (learning disability, attention deficit disorder, psychological, physical, etc.), please make an appointment to see me during office hours.

Prerequisites

MATH 2214 or MATH 2214H with a minimum grade of P.

Text and Resources

- Course packet
  I will post most everything on Scholar. Assignments, readings, announcements, class PowerPoint, and other important information will be regularly posted here. You should expect to check Scholar at least once per week.
• *Principles and Standards for School Mathematics* of the National Council of Teachers of Mathematics (a.k.a. the NCTM Standards). Become a student member of NCTM for full access to the Standards. This membership includes free access to *The Mathematics Teacher* online, a professional journal for sharing high school mathematics teaching ideas, and discount rates other teacher resources. The student e-membership is $45. [http://www.nctm.org/Membership/Membership-Options-for-Individuals/](http://www.nctm.org/Membership/Membership-Options-for-Individuals/)

**Class Materials**

Each student will need their own graphing calculator or provide a 4-pack of AAA batteries for the ones in the classroom. We will be using laptops – you may bring your own or use a MacBook Air from the classroom. These require that you have a Virginia Tech wireless account – make sure that your wireless account is working by the end of the first week. If you have an iPad, you may bring that instead. Also, please keep your course papers in an organized notebook or file that you bring to every class session.

**Evaluation**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Reflections &amp; Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Letter Writing Project</td>
<td>20%</td>
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<tr>
<td>Group Teaching Project</td>
<td>15%</td>
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<tr>
<td>Problem Sets</td>
<td>20%</td>
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<tr>
<td>Midterm</td>
<td>20%</td>
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<tr>
<td>Final exam</td>
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Tuesdays, December 15th, 10:05 am-12:05 pm

Your final grade will adhere to the following scale.

- 92%-100% = A
- 82% - 87% = B
- 72% - 77% = C
- 62% - 67% = D
- 90% - 91% = A-
- 80% - 81% = B-
- 70% - 71% = C-
- 60% - 61% = D-
- 88% - 89% = B+
- 78% - 79% = C+
- 68% - 69% = D+
- below 60% = F

**Projects and Assessment**

All assignments must be turned in by the announced due dates. Assignments may be submitted in class, or by email before class. In special circumstances only will I consider accepting late assignments, but with a penalty. All assignments must be typed, using Microsoft Equation Editor (or comparable math type applications) when necessary. Sketches may be hand-drawn if necessary but should be placed within the typed document.

Detailed descriptions for all assignments will be discussed in class, at a later time. Documents describing the assignments will be available through Scholar. Brief descriptions of the assignments follow.

- **Participation:** Attendance is mandatory. Any special cases (illness, university-sponsored events) need documentation. A high level of class participation involved focused engagement in class discussions and an evident curiosity and interest in learning.

- **Letter Writing Project:** Throughout the semester, you will exchange letters with high school pre-calculus students. You will design individualized tasks and assess student responses. The goal is to elicit high levels of reasoning from the students and help them develop concepts about discrete math.
• **Group Teaching Project:** In a group of 4-5, you will teach a 45-minute lesson based on ideas presented in a section of the IMP Year 3 textbook. The lesson should draw upon technology and other resources to extend ideas and provide conceptual challenges for your peers.

• **Problem Sets:** Every other Tuesday you will be assigned problems from textbooks and supplemental resources. For all problems, you will be expected to show your work. Some problems will also require you to break down advanced mathematical ideas and explain them in a way that high school students could understand.

• **Reflections:** On non-exam days, the last 5 minutes of class will be spent answering a short reflection question of varying types. These will be graded Credit/No Credit. Credit will only be given for thoughtful and well-explained responses, regardless of correctness.

• **Exams:** The in-class exam will assess your knowledge of all main ideas introduced in class and/or problem sets during the first half of the semester, respectively. The tentative date is October 8. If a student fails to take the exam, his/her score is zero unless the reasons for the failure are serious, unavoidable, and beyond the student's control. The instructor, after consultation with the student, will decide how to handle a missed exam.

• **Final Exam:** The final exam will assess your knowledge of all main ideas introduced in class and/or problem sets over the entire semester. The final exam, as dictated by the university, is scheduled for Tuesday, December 15th, from 10:05 am-12:05 pm.

### Attendance Policy

Attendance is required for all class sessions. You are permitted to miss 1 class without penalty. Attendance is important for the following reasons. First, as a future teacher it is important to develop the sense of responsibility needed to meet your class every day. Second, most classroom activities should yield experiences and learning that cannot be substituted with out-of-class assignments. Please notify me by email ahead of time if you know you must miss a class so that it can be excused. Excessive absences (especially absences without prior notification) may lead to a grade of WF.

### Academic Integrity

The Virginia Tech Honor Code applies to all graded work in this course. Students are responsible for understanding and adhering to the Honor Code. Among other things the Honor Code prohibits giving or receiving unauthorized aid, assistance, or unfair advantage on academic work, and it prohibits plagiarism. Under the Honor Code it is the responsibility of each student to consult with his/her teacher, if necessary, to ensure that the student understands exactly how the Honor Code applies to each piece of graded work.

http://www.honorsystem.vt.edu/