Instructor
Dr. Amy Hackenberg
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Class Times and Location
Mondays and Wednesdays 4:00 pm – 5:15 pm, ED 3017

Office Hours
Mondays and Wednesdays from 1:30 – 3:00 pm, or by appointment. Feel free to email or stop by my office at any time; if I can’t talk right then we can arrange for another time.

Required Texts and Materials
National Council of Teachers of Mathematics [NCTM] (2000). Principles and standards for school mathematics (PSSM). Reston, VA: NCTM. My recommendation is that you join NCTM; go to www.nctm.org. A student membership is $39 and gives you on-line access to e-Standards (a complete on-line version of PSSM), as well as other benefits (see below).


Supplemental Texts and Materials
We will also read some articles from Mathematics Teaching in the Middle School (MTMS) and Mathematics Teacher (MT), two journals for teachers that are published by the National Council of Teachers of Mathematics. When you join NCTM, you gain access to one on-line journal and can download up to 25 articles from other on-line NCTM journals. You also gain access to e-Standards, free registration for conferences, and a discount on NCTM materials. For details, see www.nctm.org/benefits-student.aspx

Electronic Conference and Mail
I will post assignments, overheads and notes shown in class, questions about the readings, and other important information regularly to Oncourse. Please submit all written assignments electronically using Oncourse, and become familiar with Oncourse use by the second week of classes. You are expected to check Oncourse and e-mail regularly.

Important Dates (note that most due dates are tentative)

<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Classes begin</td>
<td>2 MTMS (or MT)</td>
<td>2 Midterm exam (Case Analysis) due</td>
<td>8 Topic for Final exam due</td>
<td>6 Final exam (Reconstruction paper) due</td>
</tr>
<tr>
<td>19 MLK Day — NO class</td>
<td>Crit. Refl. due</td>
<td>11 PN collection</td>
<td>16, 18 Spring Break—NO class</td>
<td>24 PN collection</td>
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Course Goals

This course focuses on mathematics teaching and learning in the middle school, while the second mathematics methods course in the fall focuses on mathematics teaching and learning in the high school. This course has two major foci.

**The first focus is how to re-construct school mathematics in order to see it as problematic in nature.**

“School mathematics” means the mathematics that is typically taught and evaluated in schools, so it refers to mathematics curricula, but also includes mathematics instruction and assessment. Seeing school mathematics as problematic in nature means seeing it as open rather than closed, connected rather than fragmented and compartmentalized, rich and varied rather than uniform, and dynamic rather than static.

The topics that we will focus on this term are fractions and equation solving, directed quantity and integers, ratios and proportional reasoning, and rates and linearity. These are BIG ideas in middle school and early high school mathematics, and they are important for reasoning algebraically.

**The second focus is how to use this re-construction to envision creative possibilities for your students.**

To teach mathematics means to orchestrate mathematical thinking and learning for others, which necessarily involves one’s own mathematical thinking and learning. So in the course you are also expected to use your re-construction of school mathematics to open possibilities for communicating mathematically with your students and for engaging them in productive mathematical activity.

Specific goals of the course are:

1. **To experience mathematical reasoning so that your experience will serve as a framework and guide as you attempt to bring forth such reasoning in your students.** This goal includes coming to understand aspects of your own mathematical thinking that you take for granted and developing a habit of searching for foundational ideas in your own mathematical activity. It also includes developing imagery for your own mathematical thinking and using it to think about how your students may develop their mathematical ideas.

2. **To analyze mathematical foundations for school mathematics in terms of its constitutive ways of thinking, including connections among topics.** This goal involves exploring questions like: What are the constitutive ways of thinking involved in learning fractions? What is involved in learning and using proportional reasoning? How do people come to understand rates and linear relationships?

3. **To explore mathematical foundations for school mathematics in a way that will enable you to guide your students in constructing these concepts through productive mathematical activity.** This goal includes designing mathematical tasks and activities for middle school students that will engage them in creative mathematical thinking, as well as developing an understanding of how students build mathematical concepts. Again, imagery is critical here!

4. **To develop images and ideas about teaching mathematics that are compatible with the notion that students construct their own mathematical knowledge based on mathematical actions and interactions.** This goal involves exploring questions like: What kinds of teacher moves and practices (e.g., listening, asking good questions, posing appropriate follow-up problems) can support students’ construction of mathematical knowledge? How does one develop these moves and practices?

5. **To engage in discussions about a range of current issues about mathematics teaching and learning.** This goal includes co-creating an environment in which learners share and justify their thinking, ask questions, make conjectures, and take risks. This goal also involves thinking about ways to design your future classroom to facilitate mathematical learning for all students. Issues to consider include how to engage students in mathematical conversations, use technology creatively and critically, prepare to teach diverse populations of students, and assess the progress of students.

***Some of the most important “methods” you have as a teacher of mathematics are (a) your own evolving, creative mathematical thinking; and (b) your evolving understanding of your students’ mathematical thinking and how it can change through engaging students in productive mathematical activity.***
Abridged Description of Course Assignments

I will try to make the purpose of each assignment clear. If you have questions about the purpose of the assignment or what is expected of you, please ask—I am always happy to discuss your concerns with you.

On all written work, I expect you to demonstrate correct use of the English language with regard to grammar, punctuation, and spelling—I do grade on technical writing skills as well as content. Please proofread your work before submitting it. If you have weaknesses in the area of grammar, punctuation, or spelling, find someone who will proofread your work for you before you turn it in (see also the “Guidelines and Evaluation Practices for Written Assignments” handout).

Each of the course assignments has been allotted a certain number of points out of 300 possible points that you can earn in the course. More information on how I will evaluate your assignments will follow, and I will hand out rubrics for each assignment.

All assignments except for portions #1 and #2 below are to be submitted electronically using Oncourse. Detailed descriptions for all written assignments (#3-5), including evaluation rubrics, will be distributed at a later time and will also be available through Oncourse. Here are brief descriptions:

1. Problem Notebook (PN): One of your greatest assets in understanding students’ mathematical thinking is understanding and deepening your own mathematical thinking, as well as your awareness about your mathematical thinking. Therefore, part of this course is about doing mathematics, generating mathematical conversations, and reflecting on your own mathematical knowledge. We will work on many mathematical problems during the semester. So, please acquire and keep a notebook of the problems that we do (in class and for homework). You can expect problems to be assigned weekly, but I will collect your notebook THREE times during the term (approximate dates are given on the first page of this syllabus). When I collect your notebook I will:
   - evaluate your work for completeness (specified problems working on thoroughly)
   - read and assess about 5 mathematical problems in detail

   Each PN collection will be worth 25 points out of the total 300 points for the course (see rubric on the next page). Problem notebooks should be turned in on the due date, by 8:00 pm. Late notebooks will earn penalties as noted below. In some cases, you will submit problems via Oncourse because during part of the course we will do a good deal of mathematical work with GSP.

2. Readings: For discussions in class, I will ask you to read articles, case studies, or portions of PSSM. Note that due to time constraints, we will not always discuss every portion of every reading in detail. That does not mean that the particular chapter or article is not worth reading.

3. Critical Reflection on a Mathematics Teaching in the Middle School or Mathematics Teacher article: Write a critical reflection on an article from either of these NCTM journals. The article should be recent (published within the last 2 years) and address the topic of algebra or algebraic reasoning. In your reflection, give a summary of the main point(s) of the article, describe the mathematical thinking involved in any activity presented, address the strengths and weaknesses of the article, and tell what you have learned from it. Your reflection should be 3-4 double-spaced pages and is worth 25 points.

4. Case Study Analysis (the Midterm Exam): Write a thorough analysis of a case study (one that we have not yet read in class). Your analysis will be structured around issues that we discuss in class, including the mathematical reasoning involved in the case, evidence of student learning (including what they appear to have learned), identification and implications of specific teacher moves and practices, and other focal questions. A part of your analysis will involve observation in one of your field experience classrooms, and interpretations of that observation. We will read and analyze at least one case together prior to the midterm exam, so you will get a sense of what is involved in this assignment. Your case study analysis should be 8-10 pages double-spaced, with appropriate accompanying diagrams and/or problems. This assignment is worth 100 points.
5. **Reconstruction of a Mathematical Topic (the Final Exam):** Reconstruct a mathematical topic in school mathematics as problematic. Your reconstruction should be in response to these two questions: “How can I (as a middle or high school teacher) approach (mathematical topic) in terms of its constitutive ways of thinking? What creative problem solving opportunities can I open up for my students?” As we will discuss in class, formulating this kind of reconstruction can be the basis for developing many lesson plans, but the reconstruction of a mathematical topic is not a plan for a single lesson. Instead, it’s a big picture view of your goals, tasks, and activities for students in a particular mathematical area. In your reconstruction, describe how you as the teacher can re-conceive of this mathematical topic in terms of its constitutive ways of thinking; the mathematical thinking and problem solving activity you are aiming to bring forth in your students; and specific problematic situations, tasks, and activities that you will use with students. Justify your choice of problematic situations, tasks, and activities based on your goals—the mathematical thinking you are aiming to bring forth in your students. And don’t worry—we will engage in several examples of this kind of reconstruction during the course, and we will discuss this assignment in much more detail during the term. Write up your reconstruction in an 8-10 double-spaced page paper, with appropriate accompanying electronic files. This assignment is worth 100 points.

**Grading Policies**

- **Grading Standards:** Grades are based on individual performance in all aspects of the course, with grading rubrics provided for all of the assignments. Every attempt will be made to give grades that are close to those suggested by the *Teacher Education Undergraduate Grading Guidelines*. As noted in the guidelines, (1) an A is representative of outstanding performance and (2) “it is virtually impossible to prespecify all details necessary to achieve a given grade.” The guidelines also state “Students should recognize that effort alone does not necessarily guarantee above average grades.” The grade distribution for mathematics methods courses suggests that most students obtain grades ranging between B and B+. However, with grades based on individual performance rather than a comparison to others, the average grade for the course could end up higher or lower than that.

- **Grading of Problem Notebooks:** At every Problem Notebook (PN) collection, I will use the following rubric to evaluate your work:

<table>
<thead>
<tr>
<th>Mathematical Problem Notebook</th>
<th>Weak</th>
<th>Average to Good</th>
<th>Strong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoroughness (all problems completed thoroughly)</td>
<td>1</td>
<td>2-3</td>
<td>4-5</td>
</tr>
<tr>
<td>Organization (can I find all the targeted problems easily?)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Explanation &amp; Analysis of targeted problems</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
</tr>
<tr>
<td>Mathematical Correctness of targeted problems</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
</tr>
<tr>
<td>Substantiveness of exploration of targeted problems</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
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- **Policy on Resubmitting Assignments:** If you earn less than 75% of the allocated points on an assignment (other than the Final Exam), you may, if you wish, resubmit the assignment **within two weeks** of the time the original is returned to you. Please notify me immediately that you plan to resubmit the assignment and include the original along with your revised version. When grading a resubmitted assignment, I look to see that you have revised the assignment based on the comments made on the original. The *maximum grade on a resubmitted assignment is 75% of the allocated points*. Fyi, I often do not get to
grade and return revisions as quickly as I grade and return work on our “regular” schedule. I do not allow resubmitting of the Final Exam.

- **Policy on Late Assignments:** I expect that assignments will be turned in by the announced due dates and times. Assignments are to be submitted online using Oncourse, unless otherwise noted. I will accept assignments after the due date, but your grade will decrease by 10% of the allocated points for each day the assignment is late.

- **Policy on Computer Accidents:** Please make sure you save your work frequently and keep backup copies of your files when using a word processor. **Computer accidents, while very unfortunate, are not an acceptable excuse to avoid penalties for late work.**

- **Policy on Lost Assignments:** You should always keep a copy of every computer file or paper you turn in until your work is graded and you have received your course grade.

- **Attendance:** Attendance is required for all class sessions. 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, activities, ideas, and concepts we work on in class are useful to you as a beginning teacher, and they cannot easily be built up through readings or someone else’s notes. Third, class includes important whole-class and small-group discussions, as well as laboratory hands-on activities; many of these activities cannot easily be made up individually if you miss class.

- **Calculation of Final Grades:** As noted above, the points for the course total to 400 points as follows:
  - PN Collections (three): 75 pts
  - MT/MTMS Review: 25 pts
  - Midterm Case Analysis: 100 pts
  - Re-Construction Paper (Final): 100 pts

  The chart shows the point totals required to achieve specific final course grades, based on a typical 90%-80%-70%-60% scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
<th>Grade</th>
<th>Points</th>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (95% +)</td>
<td>285 points</td>
<td>B- (80%)</td>
<td>240 points</td>
<td>D+ (67%)</td>
<td>201 points</td>
</tr>
<tr>
<td>A- (90%)</td>
<td>270 points</td>
<td>C+ (77%)</td>
<td>231 points</td>
<td>D (63%)</td>
<td>189 points</td>
</tr>
<tr>
<td>B+ (87%)</td>
<td>261 points</td>
<td>C (73%)</td>
<td>219 points</td>
<td>D- (60%)</td>
<td>180 points</td>
</tr>
<tr>
<td>B (83%)</td>
<td>249 points</td>
<td>C- (70%)</td>
<td>210 points</td>
<td>F</td>
<td>&lt;180 points</td>
</tr>
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- **Attendance and Final Course Grades:** Students who are continually participating and have good attendance will have their point totals “rounded up” at the end of the semester if their score is a borderline case. For example, if someone who has earned 259 points has missed class only once, and participated regularly and professionally, their score will be rounded up to a B+. Someone with more than two absences who has earned 259 points will not have their score rounded up to a B+ and will earn a B. I do not round up scores in the A- range. Students who accrue unexcused absences will be notified via email. An alert form for excessive number of absences will be filed for students who accumulate more than 4 unexcused absences. Students who accumulate 6 or more unexcused absences will receive an FN (failure for nonattendance) grade. A doctor’s note stating the student was too ill to attend class is needed for excused absences; there is a limit of 3 excused absences in the semester. **Please inform me ahead of time if you have an unavoidable, planned absence.**

- **Tardiness:** For all the reasons given about attendance, please don’t be late to class. We have a short time together, and we will need to use all of it to accomplish the goals in the course. Tardiness not only is detrimental to the person who is late (who will miss important information and/or activities); it is disruptive to others. However, I know that occasionally life intervenes. **Please inform me if you know you have an unavoidable conflict and will be late to class.**

- **Cell phones, newspapers, etc.:** **Please turn cell phones off during class.** If you have an unusual circumstance, please inform me. Also, please do not bring newspapers and other outside reading materials to class—we have plenty to do together to keep us busy!
• **Academic Misconduct:** I hope there will be no need to worry about academic misconduct (cheating, plagiarism, etc.). All university policies concerning academic misconduct will be strictly followed and can be found at [http://dsa.indiana.edu/Code/Part_2pers.html](http://dsa.indiana.edu/Code/Part_2pers.html). Good information about plagiarism can be found at [http://education.indiana.edu/~frick/plagiarism/](http://education.indiana.edu/~frick/plagiarism/). **It is your responsibility to be familiar with these policies.**

**Final Notes**

I want to help you to become an excellent middle school or high school mathematics teacher. Please feel free to contact me (email is best, or stop by my office, 3060) should you wish to discuss matters related to the course or to teaching in general. I am happy to discuss concepts and ideas, course assignments, as well as your grades on assignments. I look forward to working with you this semester!

**Other On-Line Resources**

Math is More (a website about mathematics education): [http://www.mathismore.net/](http://www.mathismore.net/)
Teacher Professional Development and Teacher Resources by Annenberg: [http://www.learner.org/index.html](http://www.learner.org/index.html)
The official website for the Indiana Department of Education (including information about licensing):
  [http://www.doe.state.in.us/dps/](http://www.doe.state.in.us/dps/)