

MA 308 - Problem Solving for Middle School Teachers

University of Kentucky, Department of Mathematics
Spring 2019

Instructor: Julie Vega

Pronouns: She, Her, Hers

Office: POT 722

Website: <http://www.ms.uky.edu/~jve229>

Email: julianne.vega@uky.edu

Office Hours

T 2:30 PM - 4:00 PM

W 11:00 AM - 12:30 PM

Or by appointment

Meeting Times

TR 4:00 PM - 5:15 PM, CB 339

Textbooks

Readings, reflections, and writing are fundamental requirements of this course. The two main textbooks that we will be using are listed below. Please note that Boaler and Humphreys comes with an access code to view video cases which we will be using. Edition 2 of Zeitz can be accessed online.

Boaler J., Humphreys C. (2005) *Connecting Mathematical Ideas: Middle School Video Cases to Support Teaching and Learning*. Heinemann. ISBN: 978-0-325-07818-2

Zeitz P. (2007). *The Art and Craft of Problem Solving* (2nd ed.). Wiley. ISBN: 978-0-471-78901-7

Expected Learning Objectives and Corresponding Assessments

This class is intended to provide future middle school teachers with the tools to actively engage in the process of mathematical problem solving. **The emphasis is not on rote memorization of techniques, but rather on the critical reasoning, collaboration, consensus building, and communication skills necessary to solving problems in a community of learners.** While developing your own problem solving skills, you will also consider and discuss problem solving in the middle school classroom.

Students will:

- Develop and implement multiple strategies, tactics, and tools to solve problems;
- Identify patterns and generalize to abstract reasoning;

- Generate ideas to attack new and/or unfamiliar problems;
- Develop techniques to persist;
- Effectively communicate understanding and ideas through written and oral responses
- Challenge and critique reasoning
- Rigorously evaluate conclusions, ideas, and progress;
- Compare growth and fixed mindset;
- Evaluate strategies to promote creative thinking, growth mindset, and curiosity;
- Reflect on and articulate their own educational philosophy;
- Identify personal stage of critical thinking development and create goals for continued progress.

As evidenced through:

- Responses to essay prompts and reflections on video cases;
- Attempting and presenting the Problem of the Day;
- Participation on In-Class Worksheets and activities;
- Written responses to Take-Home Problems;
- Development of Student Portfolio.

Expectations of Students

While this will be repeated later, it is important to note now that this class operates differently than many other “standard math classes.” There will be very little lecture but significant amounts of problem solving and conversation. This will involve activities such as working in a group and presenting ideas at the board. This structure will reinforce some key ideas of problem solving:

- Collaboration is an important component of mathematical work.
- Solving problems does not fundamentally involve following procedures, but making sense of difficult concepts. There may be many valid ways to reach a correct answer.
- A problem is not completed until its solution can be presented clearly and convincingly to others.

- The study of mathematics is inherently difficult. Making mistakes and working through incorrect solutions is an unavoidable aspect of problem solving.

You will be expected to engage each day with the material and contribute to class discussions appropriately. When material is presented at the projector or board, you are expected to take handwritten notes. Every day, you will work in groups and discuss the problems with your peers. Though it may be tempting to misuse your time here, please remain focused on the mathematics. Again, students using technology in a way that does not contribute to learning will be asked to put the device away.

Students in strong disobedience of the expectations of this syllabus, or who are not respecting the dignity of students or professors around them, may be asked to leave class.

You should be sure to keep up with all assignments and exam dates on the provided handouts or on Canvas. Any other handouts, links, calendars, etc. can also be found on Canvas. Be sure to consult these pages often!

Problem of the Day and Presentations

Once a week, I will give you a “problem of the day,” to be completed at home before the next Tuesday class meeting. These will be graded for completion. However, full credit will only be granted to those who make a full effort. If you have an expected excused absence, be sure to send your Problem of the Day to class with a classmate, or email it to me directly ahead of time. Late Problem of the Day solutions will not be accepted.

Usually, about 3-6 students will present their solutions to the problem of the day at the beginning of class. The more presentations you volunteer to give, the higher your presentation grade will be. The exact number of presentations needed for full presentation credit at the end of the semester will vary, depending on the speed of the material and number of people in the class. However, a good rule of thumb for now is to aim to present about every 3rd or 4th Problem of the Day.

The purpose of these presentations is to demonstrate and communicate your critical thinking, get constructive feedback, and build consensus towards a solution as a community of learners. Your solution does not need to be correct in order to present!

Take-Home Problems

The problem sets are the most important component of the class, and the problems that you take home to solve will be graded with such importance in mind.

Take-home problem sets will be assigned approximately weekly. They may be hand-written or typed, with each problem starting on a new page. **Note that problem solving is messy! You should work out each problem on scratch paper before writing up**

your final solution. Each assignment must be submitted by uploading the assignment to Canvas by the **beginning** of class on its due date. Late assignments will be accepted up to three calendar days after the due date, with a 25% penalty per day. If you have an anticipated excused absence from class, you will need to submit the problem set early.

The grading rubric for these take-home problems will be provided before the first assignment is given.

Essays and Reflections

Several short essay or reflection assignments will be given throughout the semester, typically relating to a reading and/or video from the text by Boaler and Humphreys. The purpose of these writing assignments is to get you thinking about problem solving in the context of a middle school classroom. Your submitted thoughts and reflections about the teaching and learning of problem solving will help to set the gears of your “teacher mind” in action! These must be typed and submitted online via Canvas document upload.

Exams

We will have two exams, one midterm exam (tentatively 2/26/19) and a cumulative final (5/3/19).

The exams will have two parts:

1. The written portion will consist of two or three problems to solve. You will have the full allotted time to solve the problem and write up a clear and concise response. Participation and feedback from the Take-Home Problems will help you prepare. **The purpose of the written portion is to assess your ability to communicate your ideas and persuade the reader. In addition, it provides individual accountability in a heavily-group oriented class.**
2. The take-home/ oral portion will be completed with a randomly assigned partner and is due on the day of the exam. The partnership will create a 7 minute long video tape of their process of working through a new problem. **The problem must be opened and read on tape.** Participation and feedback from classwork and Problem of the Day presentations will help you prepare. **The purpose of this portion is to capture the students ability to navigate problem solving. From understanding the problem to using multiple tactics to persisting and working towards a solution. It is not necessary to arrive at a correct solution.** There are cameras and tripods (that can hold phones) available in the Library.

The grading rubric for the exam will be provided before the Midterm Exam.

Portfolio

The MA 308 student portfolio will be created through Canvas (tentatively due 4/23/19). The purpose of the portfolio is for students to evaluate their progress on three of the course learning objectives. For each of the three chosen learning objectives, the student must upload two assignments to evidence student growth and write a reflection paragraph explaining why the assignments were chosen and how the student has grown.

Attendance/Participation

Attendance is required at every class meeting. See “Absences” for details on excused absences.

Every class meeting, students will be asked to participate in a variety of ways, including class discussions, group work, group discussions, etc. It is expected that students give their full attention and meaningful feedback during these times.

Attendance and participation will count towards 5% of your overall grade. Tardiness, leaving class early, lack of participation, disruption of the learning environment, or improper technology usage may result in either a partial or full loss of attendance/participation credit.

Absences

No attendance grade, late homework, missed quizzes/assignments, or missed exams will be given full credit or opportunity to be made up

Should a student have a valid excuse for an absence, she or he is expected to complete the missed assignment within one week of the submission of excused absence, unless there are extenuating circumstances.

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed, per University policy.

Grading Policy

Your final grade will be calculated based on the following weights:

Attendance/Participation	60 pts
Problems of the Day	28 pts
Presentations	20 pts
Take-Home Problems	120 pts
Essay Assignments	24 pts
Portfolio	30 pts
Midterm Exam	100 pts
Final Exam	100 pts
<hr/> Total	<hr/> 482 pts

After rounding to the nearest percent, final letter grades will be assigned as follows:

All grade concerns including, but not limited to, errors in grading assignments or exams, issues with graded assignments, etc. should be brought to my attention within a week from

- A: 90% - 100%
- B: 80% - 89%
- C: 70% - 79%
- D: 60% - 69%
- E: Below 60%

the time the assignment was returned.

Technology Policy

All technology, including cell phones, laptop computers, or tablet computers should be turned off and put away unless I deem it to be an appropriate time. We may sometimes use our devices for the purpose of learning. When these periods of time are over, you should put away the device until another appropriate time. Students using technology in a way that does not contribute to learning will be asked to put the device away. Failure to abide by this policy will, at minimum, result in a loss of attendance/participation credit. Students who have special circumstances or needs surrounding technology usage should see me at the beginning of the semester.

Commitment to Universal Design for Learning

University of Kentucky is committed to ensuring full participation of all students. If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. If you have an undocumented disability and would like to receive assistance, please see the DRC. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is <http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/>.

Academic Integrity

Students are expected to abide by university policy in regards to academic integrity. Students are **encouraged** to collaborate to understand problems and develop solutions both inside and outside of class. However, each student must submit their own work and should write his or her final solution independently. Consultation of the internet for solutions is considered cheating. Cheating on homework, quizzes, exams, and written work will not be tolerated, and will lead to (at least) a zero on the assignment. Please read the Code of Student Rights and Responsibilities for information on academic integrity.

UK Mathematics Department Professional Themes

This course will address the four themes of the conceptual framework for the UK professional education program: **research**, **reflection**, **learning**, and **leading**. Students will engage with fundamental ideas in mathematical *research*, *reflecting* on and analyzing core math-

emathical content that arises throughout mathematics at all levels. Students will develop as life-long mathematical *learners* who will be able to take active *leadership* roles in their future roles as professionals and citizens. The ultimate goal in addressing these four themes is to produce teacher leaders who work together to improve student learning among diverse populations and improve education in Kentucky and beyond.

Unbridled Learning Initiatives and the Kentucky Core Academic Standards

This course will provide students an opportunity to advance their knowledge and mastery of the “tools” associated with Kentucky education reform, focusing on the content and practice standards outlined in the the Kentucky Core Academic Standards. As students carry out projects and complete assignments that involve mathematical content underlying instructional activities for P-12 students in Kentucky schools, they will address one or more components of the Unbridled Learning initiatives.

Non-Discrimination Statement and Title IX Information

The University of Kentucky faculty are committed to supporting students and upholding the University’s non-discrimination policy.

Discrimination is prohibited at UK. If you experience an incident of discrimination we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, (859) 257-8927.

Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence: If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA, understand that as a “Responsible Employee” of the University these individuals **MUST** report any acts of violence (including verbal bullying and sexual harassment) to the University’s Title IX Coordinator in the IEEO Office. If you would like to speak with someone who may be able to afford you confidentiality, the Violence Intervention and Prevention (VIP) program (Frazee Hall – Lower Level; <http://www.uky.edu/StudentAffairs/VIPCenter/>), the Counseling Center (106 Frazee Hall, <http://www.uky.edu/StudentAffairs/Counseling/>), and the University Health Services (<http://ukhealthcare.uky.edu/uhs/student-health/>) are confidential resources on campus.

Tips For Success

It is likely that many students will find this course challenging because of the nature of the material. However, there are several ways to set yourself up for success:

- **Start your assignments early.** You will almost certainly have more thoughtful essays and solve more problems if you begin thinking about the assignment several days before you write up your submission. Ideas do not always come on demand, and may require days of intermittent reflection.

- **Find one or more classmates with whom to work.** Everything you turn in must be completely written by you, but you are allowed and even encouraged to share ideas with others. Group work has been demonstrated to increase understanding among math students.
- **Come see me during office hours.** Always feel free to contact me! All my contact information is at the top of the first page and under the contact section on my website. It is both my job and my passion to help students learn what they came to class to understand. Email me, see me after class, set up a meeting time, come to office hours - whatever would help you learn best, I'll try and help you out!

Changes

I reserve the right to change or amend this syllabus at any time. In this event, proper notice will be given in class.

Important Dates! - All due dates posted will be on Canvas!

1/30/19 Last day to drop without "W" on transcript

2/26/19 Midterm Exam (Tentative)

3/11/19 - 3/16/19 Spring Break

3/29/19 Last day to withdraw

4/25/19 Last day of classes

5/3/19 Final Exam at 8:00 AM