

**Mathematics 67-712 (3 credits)**  
**Problem Solving for Teachers**  
**Online course meeting June 15-July 10, 2020**

*“A pupil from whom nothing is ever demanded that he cannot do, never does all he can.”*  
*-John Stuart Mill*

**Instructor:** Dr. Amy Parrott

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**Office Hours:** I am available Monday-Friday 9:00am -9:00 pm to meet with you or your group through Collaborate Ultra. Please send me an e-mail to schedule a meeting time.

**Course Catalogue Description:** This course is for teachers of middle and high school mathematics who are interested in improving their own problem solving skills and are looking for ideas on how to implement more problem solving into their classrooms. The first part of the course will engage the student in problem solving and mathematical modeling. The specific types of problems considered will depend on the interest and background of the class. The remainder of the course will focus on curricular issues and ways teachers can teach via problem solving. Prerequisite: Consent of instructor.

**Learning Objectives:** This course is designed to engage students in various aspects of the problem solving process. Through this engagement, students will be better equipped to pose problems and guide their own students through the process of problem solving. Upon successful completion of the course, students are expected to have the ability to:

- Describe the nature and cultural practices of mathematics.
- Employ several appropriate strategies to successfully solve problems.
- Articulate clearly their problem solving process.
- Communicate mathematics both orally and in writing using precise mathematical language.
- Listen to, evaluate effectively, and constructively critique the mathematical ideas of peers.
- Engage effectively in the work of mathematical inquiry through generating conjectures and developing extensions of problems.
- Write and identify problems that bring out specific content ideas while actively engaging students in problem solving.
- Identify ways to help direct students during their problem solving process.

**Format and Attendance Policy :** This course will be delivered entirely online through Canvas. All required readings, videos, assignments, and additional resources will be posted on Canvas. You will engage in a variety of activities individually, in small groups, and in our whole class group. We will pose and solve problems from all areas of mathematics and develop our skills as problem solvers. While some of the problems will be at the graduate level, some problems will be appropriate to use in a secondary education or undergraduate classroom. Other activities will include: discussing prepared readings, writing problems, and critiquing others' work. Because it is so important for your own learning, as well as the learning of your fellow classmates, I expect that you will fully attend to and participate in each of these activities. A weekly checklist with due dates will be posted on Canvas.

**Course Outline:**

- Week 1: Mathematical thinking
- Week 2: Hallmarks of a good problem
- Week 3: Problem solving in the classroom
- Week 4: Project presentations

**Materials Needed:**

Required: Reliable computer with internet access.

Highly Recommended: Students have found graph paper and various colored pens/pencils beneficial to aid in problem solving.

**Grading:** Your grade in this course will be determined using standards based grading. This means that your grade will be determined at the end of the course by your demonstration of your mastery of the standards connected to this course. These standards are listed below with examples of evidence that would show proficiency in each standard.

You will have multiple opportunities to demonstrate your proficiency in each standard. These opportunities include individual activities such as problem write-ups, projects, and peer critiques; small group activities/discussions; and whole group activities/discussions. All of these activities are described in detail in a separate documents posted on Canvas. Problem write-ups will be June 21, June 28, and July 6 at midnight. Final copies of projects are due July 10 at midnight. Small and large group activities/discussions will be due throughout the four weeks. Please see Canvas for the specific due dates.

Your careful reading of assigned articles, critical viewing of assigned films, and your contribution to class discussions is very important. It is your obligation to demonstrate to me that you have both completed and thought about the readings and assignments. I also expect you to participate during problem solving by actively attempting to solve each problem as well as contributing to the discussions we have about the various approaches you and your classmates have taken in solving the problems.

<b>Math 712 Standards</b> with examples of evidence supporting each standard	
S1: Written Communication	Writing is well organized and mathematically accurate with few distracting errors Deductive arguments are communicated clearly
S2: Attend to Precision	Writing is precise with definitions used appropriately Diagrams are presented clearly and correctly convey mathematical ideas Calculations are performed accurately
S3: Make sense of problems	Descriptions of problems clearly indicated you have fully made sense of the problems
S4: Problem solving	Devise and carry out plans that apply a variety of of appropriate strategies to solve problems Articulate clearly problem solving processes
S5: Mathematical Inquiry	Generate conjectures and extend problems to further mathematical inquiry
S6: Analysis of others	Provide constructive critiques of others' problem solutions and proposed problems
S7: Write Problems	Write and identify problems that bring out specific content ideas while actively engaging students in problem solving Identify ways to use problem solving strategies to help students understand mathematics
S8: Contribute to our Mathematical Community	Actively contribute to small and large group discussions including both asking and answering questions Present problems and solution ideas to the class

Each standard will be scored according to the following rubric:

**Unevidenced:** Insufficient information present to assess.

**Not Yet:** Student has not yet demonstrated the ideas for this standard. There are serious misconceptions present. Student has not yet grasped the skills needed.

**Basic:** Student has some basic concepts of this standard down but is still working to develop the ideas for this standard.

**Almost Proficient:** Student demonstrates partial mastery of this standard.

**Proficient:** Student consistently demonstrates a full mastery and understanding of the ideas for this standard.

Your final grade will be determined by examining your level of proficiency at the end of the course in each of the standards. Grades will be no stricter than the following:

- A:** Proficient understanding in nearly all standards with no standards below basic.
- B:** Almost proficient understanding in all standards - or equivalent balance with no standards below basic.
- C:** Basic understanding in all standards.
- D:** Student has not yet mastered one or two standards.
- F:** Student has not yet mastered three or more standards.

Plus and minus grades (A-, B+, B-, etc.) will be used to indicate significant deviations from the above scale.

**Making Mistakes:** It is my firm belief that mistakes are valuable learning experiences. It is expected that you will make mistakes in this class. I encourage you to share not only your successes with our class, but also share your mistakes you made along the way. Often, we learn more from seeing an incorrect solution and analyzing it than we learn from seeing correct solutions.

**Online Discussions Expectations** These expectations will be posted on Canvas and may be updated as the course progresses. You are expected to abide by these standards.

1. Critique ideas, not people. Feel free to disagree, but make sure you have understood the other's position first.
2. Stay on topic. If you wish to raise a new topic, make a new post, do not reply to the current post.
3. Keep your responses short. It is supposed to be a discussion not an essay competition.
4. Make constructive comments that move the discussion forward. No one wants to read 14 comments that say, "I agree" – that is what the "like" button is for.
5. Try not to dominate the discussion. Give other's the opportunity to contribute too.
6. Emoticons can be helpful to convey your tone, but do not overuse them. Similarly, all caps is considered shouting. Only shout when absolutely necessary.

**Academic Policies:** You are expected to behave with integrity and honor. Plagiarizing (this includes looking up problem solutions online) or any other form of academic dishonesty will be dealt in accordance with the current UWO Student Discipline Code. The instructor reserves the right to assign a grade of “F” for the course should circumstances warrant. The official UWO policy regarding academic misconduct can be found at:  
<https://www.uwosh.edu/deanofstudents/university-policies-procedures/academic-misconduct>

Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990:  
<https://uwosh.edu/financialaid/consumer-information/>.

The University of Wisconsin Oshkosh supports the right of all enrolled students to a full and equal educational opportunity. It is the University's policy to provide reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements.

Students are expected to inform Instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan from either the Accessibility Center, Project Success, or both. Reasonable accommodations for students with disabilities is a shared Instructor and student responsibility. The Accessibility Center is part of the Dean of Students Office and is located in 125 Dempsey Hall. For more information call 920-424-3100, email [accessibilitycenter@uwosh.edu](mailto:accessibilitycenter@uwosh.edu), or visit  
<https://www.uwosh.edu/deanofstudents/Accessibility-Center>.

**Resources:** There are many resources available to help you succeed in this course as well as thrive at UWO. If you are struggling with this course, please talk with me during office hours or make an appointment to meet outside of the scheduled times. Additionally, the following are available to help you:

Dean of Students Office: If you are encountering a problem and you are not sure where to turn, contact the Dean of Students Office. Whether it is an issue in a class or a problem with your landlord, they can help with support and advocacy. The office is located in Dempsey 125 <https://uwosh.edu/deanofstudents/>

Technical Help: If you have a technology issue, contact the help desk: [helpdesk@uwosh.edu](mailto:helpdesk@uwosh.edu) or (920)424-3020. You can also search the Knowledge-Base [uwosh.edu/it/](http://uwosh.edu/it/).

Other Resources: Please check out <http://www.uwosh.edu/resources/> for additional resources available to you.