MA 241: Geometry for Middle School Teachers

Section 001, Fall 2024

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Office Hours: Thursday 3:00-5:00 p.m., or by appointment

Course Meetings: TR 5:00–6:15 p.m., Chemistry-Physics Building (CP) 208

Course Description
A course in plane and solid geometry designed to give middle school mathematics teachers the knowledge needed to teach a beginning geometry course. Cannot be counted toward the mathematics minor or major.

The emphasis of the course is on developing conceptual knowledge, which is a requirement for effectively communicating mathematics to middle school students. We will concentrate on the *why* more than the *how*. This is not a pedagogy course; this is an upper level college mathematics course in which you will acquire mathematical skills to use as a future educator.

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, reflection on and analyzing core mathematical content that arise 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 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 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.

Required Materials
We will use the following six units from the Connected Mathematics Project:

1. *Connected Mathematics 3 Student Edition Grade 6: Covering and Surrounding: Two-Dimensional Measurement.* ISBN: 978-0133274417.

2. *Connected Mathematics 3 Student Edition Grade 7: Shapes and Designs: Two-Dimensional Geometry.* ISBN: 978-0133274479.

3. *Connected Mathematics 3 Student Edition Grade 7: Stretching and Shrinking: Understanding Similarity.* ISBN: 978-0133274486.

4. *Connected Mathematics 3 Student Edition Grade 7: Filling and Wrapping: Three-Dimensional Measurement.* ISBN: 978-0133276411.

5. *Connected Mathematics 3 Student Edition Grade 8: Looking for Pythagoras: The Pythagorean Theorem.* ISBN: 978-0133274516.

6. *Connected Mathematics 3 Student Edition Grade 8: Butterflies, Pinwheels, and Wallpaper: Symmetry and Transformations.* ISBN: 978-0133276435.

Expected Learning Objectives and Corresponding Assessments
In this course, students will:

- Classify 2- and 3-dimensional shapes by geometric properties;
- Justify similarity and congruence of two shapes;
- Formally define transformations (i.e. translations, rotations, dilations, and reflections) on a coordinate plane;
- Apply properties of angles and algebra to solve for unknown values;
- Explore and understand the relationship between radius, diameter, circumference, and area of a circle;
- Derive the area and volume of triangles, quadrilaterals, polygons, and irregular shapes;
- Develop and implement multiple strategies, tactics, and tools to solve problems;
- Identify patterns and generalize to abstract reasoning;
- Develop techniques to persist;
- Effectively communicate understanding and ideas through written and oral responses;
- Challenge and critique reasoning;
- Rigorously evaluate conclusions, ideas, and progress;
- Evaluate lessons and activities to promote creative thinking, curiosity, and a growth mindset.

As evidenced through:

- Participation in activities and in-class worksheets;
- Homework assignments and written reflections;
- Mini-exams

Tips For Success

- Math is not a spectator sport; the only way of really learning math is by doing math.
- If you are struggling with the material, ask for help, either from your classmates or the instructor.
- Work with other students outside of class, both on the homework and to review the material.
- Start assignments early. Unfamiliar math concepts can take some time to sink in.
- When you read a math textbook, read with pencil and paper in hand. Don't just passively follow along; work through the example problems yourself.
- Ask questions in class. If you're wondering about something, chances are someone else has the exact same question.
- Doing math often feels like a struggle, even for professional mathematicians. This is perfectly normal; it means that you're learning!

Canvas
All announcements will be posted in Canvas, and files will be posted on Canvas. Assignments will be submitted and grades will be recorded in Canvas.

Classroom Expectations
All students are expected to behave in a manner conducive to an atmosphere of learning. This includes, but is not limited to, being courteous and respectful to other students and the instructor, actively participating in class activities, and refraining from any behavior that may distract or disturb other students.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor.

In-Class Participation
We will meet weekly in small groups for discussions and activities related to the course material. You are expected to come to these meetings prepared and actively participate in the discussion or activity. If you are unable to attend class, let me know as far in advance as possible; you will be provided an alternate activity to complete in order to meet the "in-class participation" requirement for a passing grade in the course. Class participation will vary over the course of the semester, ranging from completing in-class discussion to completing worksheets in pairs. If your participation is not satisfactory, your will be given a warning, and in the event you are at risk of not receiving a passing grade, I will email you with information regarding how you can return to a passing grade.

Homework
You will be asked to completely weekly homework assignments as an opportunity to deepen your understanding of the material and practice communicating your mathematical ideas clearly and precisely. Homework solutions can be typed or neatly handwritten and scanned, and may be submitted in class or via Canvas on the assignment due date. You are permitted to work with your peers on these homework problems, but you must indicate who you collaborated with on each assignment.

Writing Assignments
There will be five short writing assignments throughout the semester, designed to challenge you to reflect on your understanding of the mathematical content and your role as a student and future teacher of mathematics. These reflections should be typed and submitted through Canvas. As these are oriented at reflection and personal understanding, collaboration is minimally relevant, but all responses should be distinct and personally relevant.

Mini Exams
There will be six short assessment periods over the course of the semester, each one focusing on major concepts and ideas from the Connected Mathematics books. These "mini-exams" will be in-class and take 20-30 minutes, generally two or three multipart questions. There will not be a final examination. Collaboration is not allowed during the assessments themselves, but you may request to discuss the questions with others when revising.

Grading Scale
All homework problems, writing assignments, and exam questions will be graded on the following scale:

P	Pass	The work exceeds the basic expectations of the assignment; it demonstrates understanding of the concepts and methods of communicating these ideas, even if it contains non-critical errors.
R	Revision Required	Partial understanding of the concepts is evident, but there are significant errors or gaps; additional work or improved explanation is needed.

Revisions
Any homework problem, writing assignment, or exam question with a grade of R can be revised and submitted for regrading within one week of receiving the grade; the new score will replace the old score. You may submit as many revisions as you like within this time frame. If you need an extension on a revision, please contact me as soon as possible.

Final Grades
Your final grade will be determined according to the following table:

	A	**B**	**C**	**D**
Homework Problems with P (total of 42)	38	34	30	26
Writing Assignments with P (total of 5)	5	5	4	3
Mini Exam Questions with P (total of 16)	14	12	10	8
Attend and actively participate in all in-class activities	Yes	Yes	Yes	Yes

For example, to earn a B you must do all of the following: (1) earn a P on at least 34 of the homework problems, (2) earn a P on all 5 of the writing assignments, (3) earn a P on at least 12 of the exam questions, and (4) attend and actively participate in class.

Midterm Grades
Midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar: `https://www.uky.edu/registrar/content/academic-calendar`.

Important Dates

- **September 5** Mini Exam 1
- **September 15** Last day to drop without a "W" on your transcript
- **September 19** Mini Exam 2
- **October 8** Mini Exam 3
- **October 24** Mini Exam 4
- **October 28-29** No Classes - Fall Break
- **November 5** No Classes - Election Day
- **November 19** Mini Exam 5
- **November 27-29** No Classes - Thanksgiving Break
- **December 10** Mini Exam 6
- **December 12-13** No Classes - Reading Days

Office Hours
I will be available in my office to answer question and help with understanding during office hours. I am also happy to meet over zoom. If my office hours do not work for you, please send me an email and we can find another time that works best.

The best way to get the most out of an office visit is to come prepared! It will be very helpful if you write down your questions ahead of time and bring your work from your first attempts to do problems with you to my office.

Emails
You may contact me by direct message in Canvas or by email; I will generally reply to messages within 24 hours on days when class is in session and 48 hours otherwise. Make sure that you use your University of Kentucky (UK) email address (contains `@uky.edu`) when corresponding with me via email; I will not respond to emails from non-UK email addresses. If you have a question regarding homework or course material, send me an email as soon as you can. When in doubt about anything, send me an email.

Academic Policy
A full list of UK academic policies is available at https://provost.uky.edu/proposals/guidance-course-proposals/standard-academic-policy-statements

Academic Integrity
UK policies on academic offenses are available at https://provost.uky.edu/proposals/guidance-course-proposals/academic-offenses
For a thorough description of "plagiarism," see https://ombud.uky.edu/students/what-plagiarism
For a thorough description of "cheating," see https://ombud.uky.edu/students/what-cheating

Resources
The university offers a variety of resources available to students. Visit the Office of Student Success at https://studentsuccess.uky.edu/student-success-units-and-programs to access the full list.

Classroom Emergency Preparedness and Response
Please see the following link for information related to emergency reporting and action: https://provost.uky.edu/curriculumproposals/syllabus-information