MATH 278: Foundations of Geometry
Spring 2023

Contact Me	Meet with Me	Class Info
		
Name: Dr. Maggie **Pronouns:** She/Her/Hers **Email:** rahmoeller@roanoke.edu	**Office:** Trexler 270B **Student Hours:** MWF 10:30 – 11:30AM Or email me to meet at a different time!	**Location:** Miller 13 **Days:** MWF **Time:** Noon-1:00PM

Course Description: A review of Euclidean geometry and an introduction to non-Euclidean geometries, with a special focus on the theoretical framework of various geometric systems.

Intended Learning Outcomes: Students will be able to

- Construct valid proofs that proceed efficiently from hypothesis to conclusion
- Identify properties of triangles, parallel lines, and other objects in different geometries
- Identify the properties of isometries in different contexts
- Perform geometric constructions using software
- Present complete geometric arguments orally and in writing.

Your success in this class is important to me! We all learn differently and bring a variety of strengths and needs to the class. If there are aspects of the course that prevent you from learning or that make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

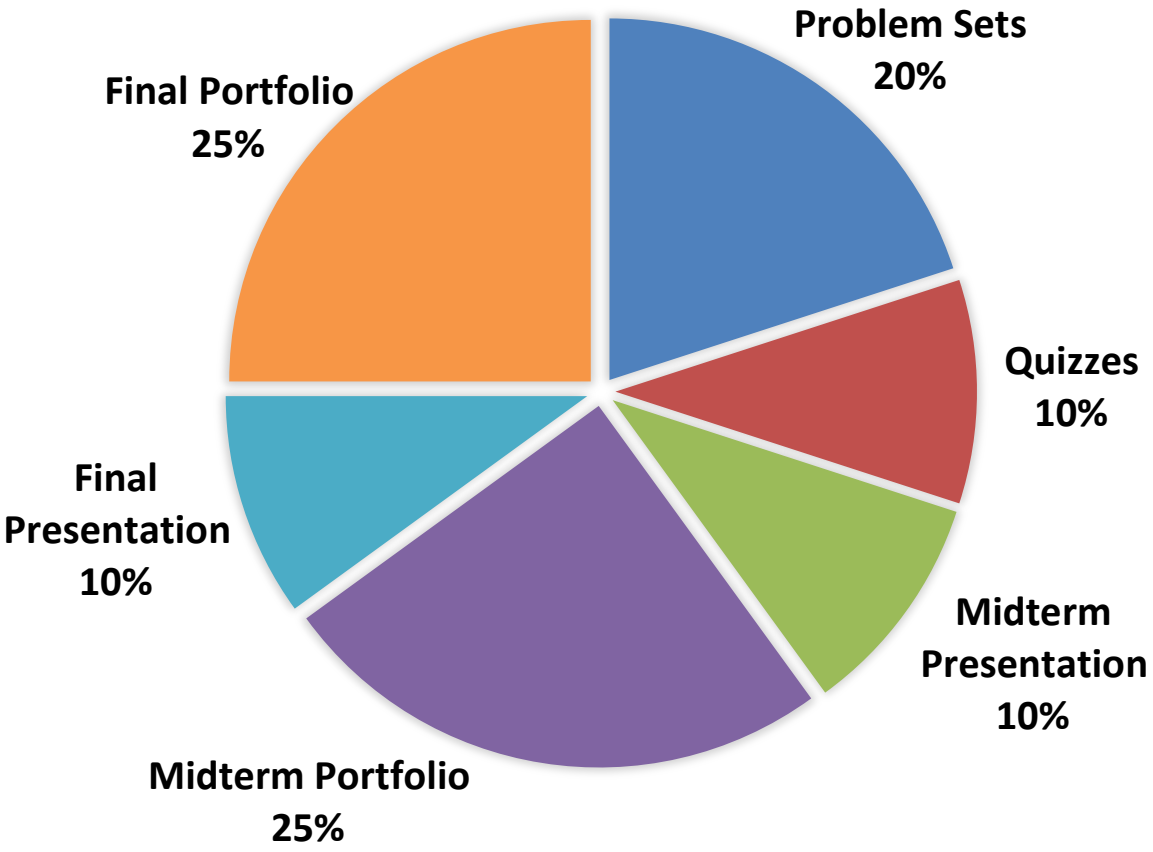
Required Materials:

- *Exploring Geometry*; Michael Hvidsten, 2nd Edition

- GeoGebra, Spherical Easel software, as needed
- **Recommended:** Laptop computer

Commitment Hours: This course expects you to spend at least 12 hours of work a week inside and outside of class.

GRADE DISTRIBUTION:



Grades will be determined based on the following:

A	93-100	B	83 – 87	C	73 – 77	D	63 – 67
A-	90 – 93	B-	80 – 83	C-	70 – 73	D-	60 – 63 B+
	87 – 90	C+	77 – 80	D+	67 – 70	F	< 60

COURSE EXPECTATIONS

Classroom Environment: You are expected to treat all students in the class and me with courtesy and respect. Your comments to others should be factual, constructive, and free from harassing statements. You are encouraged to disagree with other students, but such disagreements need to be based upon facts and documentation (rather than prejudices and personalities). My goal is to promote an atmosphere of mutual respect in the classroom. Please let me know if you have suggestions for improving the classroom environment. (Source: Iowa State University)

Diversity and Inclusivity

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Attendance Policy: Our course's success depends on you attending class! If you miss class, you will miss community building, engaging conversations, and information that I deem worthy of your time! Plus, we will miss you!

However, life happens! You may get sick, have a game scheduled, or have something else come up. It will not be the end of the world if you miss a class *very occasionally*. At some point, though, missing class can be detrimental to success. So, do your best to be in class! Strive for perfect attendance!

What should you do if you have to miss class? Let me know ASAP! Communication is key! I don't need details (please, spare me the details!) but do let me know ahead of time, so we can make plans, if needed. If you cannot let me know ahead of time (emergencies do happen!), just let me know as soon as you can. Email is typically the best form of communication for me.

If you are sick (and contagious), please either stay home OR come to class wearing a mask (unless you have COVID symptoms – then follow both Roanoke College & CDC guidelines). And be sure to use Health Services on campus!

Late Work: Whether or not to accept late work is always a tough decision. Life happens – and occasionally we need more time to complete tasks! But, sometimes turning in an assignment late causes more complications than benefits.

In this course, we will have weekly problem sets, in-class quizzes, presentations, and portfolios:

- In-class quizzes can be made up in student hours, as long as you make them up within a week of them being given.

- Problem sets need to be turned in within 2 days of being due – I need to be able to post solutions within a reasonable timeframe for you to access. But late problem sets will lose presentation points.

- Presentations are set for certain days during the semester – these are hard to make up. But – in rare circumstances – I will work with you should you need to miss a presentation day.

- Portfolios have 2 deadlines – ○ Checkpoints throughout the semester. This is a chance for you to submit problems intended for your portfolios to me for feedback. If you do not make a checkpoint, I will not provide you with feedback for that part of the portfolio. But you are not required to make these checkpoints. It is, however, quite beneficial for you to do so.

- The official due date for the portfolio. Problems MUST be turned in by this deadline. Why? You will be presenting a problem from your portfolio – I need to know the work is your work and not what you copied from a presentation. Also…I have to grade your entire portfolio by a deadline (midterm grades are due Monday, March 6 and final grades are due Wednesday, May 3 for graduating seniors and Monday, May 8 for everyone else).

  But – need a bit more time for some other part of the portfolio? Ok – I can take the papers and activities late – but only if you email me and get confirmation that it is ok to turn in these parts late.

In summary, the best thing you can do is *communicate* with me. Let me know if you have concerns about turning in an assignment on time – I will do my best to work with you.

Academic Integrity: Students are expected to adhere to the Academic Integrity policies of Roanoke College (https://www.roanoke.edu/inside/a-z_index/academic_integrity). All work submitted for a grade is to be your own work! No collaboration is allowed on quizzes or on your portfolios.

I encourage collaboration on problem sets! I want you to chat with each other, brainstorm with each other, help each other set up proofs, sketch visuals to help with the setup, and/or come up with an outline for how the proof might go. Feel free to jot down ideas and thoughts as you are working together. But when you go to write up your solutions completely, you should write them up individually. You should not be copying from another student's solution, nor asking someone what to do next while writing up your solution, nor discussing the problem with anyone else while writing up your solution. In other words, writing up your solutions should happen outside of any collaborative time. What I want? Y'all to help each other and throw ideas around! What I don't want? Someone sitting passively by, frantically writing down everything one person (or more) is saying...i.e. one person telling another how to do the problem.

You may use GeoGebra and/or Spherical Easel for help with any problems - practice problems, problem sets, or portfolio problems. You may also look at solutions to problems we have done in

class or problems that are worked through in the textbook for the course. But using unauthorized sources is a violation of Academic Integrity. This includes solutions posted online (not on Inquire) and ”homework help” sites. Uploading our course assignments to these sites is also a violation of Academic Integrity.

WHY? You spend a lot of money attending Roanoke College working toward a (or several) degree(s). Don’t you want that degree to mean something? If RC students are only getting degrees by cheating, then does that degree actually mean anything? If we were to get a reputation for a “cheating” school…do you think you’d get a job after Roanoke College?

Besides, I like to be helpful. Ask me for help ☺ Especially when it’s the night before something is due and you cannot figure out that one problem or you waited too long to start the assignment (which everyone does at least once) – **email me!!!!** Tell me you are sorry for procrastinating – that you will try not to do it again – that you are confused – that you need help and an extension! And then trust that I’ll help you. If this becomes a habit? We have a problem and there will be consequences and strategies for changing. But…those consequences aren’t as severe as failing the course entirely (most common AI violation penalty). So – email me!!!

COURSE ASSIGNMENTS

Reading & Participation: The key to learning a topic in mathematics is participation. We will strive to have an active, rather than passive, classroom environment. The last page of the syllabus is a day-by-day outline of the sections that will be discussed in class (this is subject to change as needed). You are fully expected to have read the upcoming sections in the textbook before the class meeting! Being an active participant doesn’t mean just attending class, it also means asking questions, offering suggestions when working through a problem as a class, and attempting to answer questions I pose - in other words, being engaged with the material.

In addition, Practice Problems will be listed on Inquire. These will serve to both review material from the previous class as well as introduce new material. These will not be collected but you are expected to attempt every problem before the next class period.

Problem Sets: A problem set will be due almost every week (mostly on Fridays) - see the schedule at the end of this document. These will be assigned the previous week and are each worth a total of 25 points. The problems will be worth 20 points total, carefully graded for correctness and completion of the solutions. The remaining 5 points is for presentation of the problems.

For the first week we will have two problems assigned on Wednesday and due Friday, to get you accustomed to the grading; this assignment will be worth 10 points.

Your homework must be neat and organized, with the problems listed in order, and will be submitted through the appropriate link on Inquire. You may type your solutions, but this is not required; otherwise, use scanning software. Preview any work before you submit it. It is your responsibility to make sure your uploaded work is readable. Upload your work as a pdf (need help making a pdf on your computer? Let me know).

Quizzes: There will be quizzes in this class. I may occasionally warn you about an upcoming quiz, but you should be prepared to take a quiz on any given day. These will generally test definition knowledge and recognizing main concepts from material recently discussed in class.

Midterm & Final Portfolio: In place of tests and a final exam, you will prepare and turn in a Portfolio. The portfolio will contain your solutions to chosen problems, papers about assigned topics, and work done for in-class activities. You will be given a list of topics that must be included in the portfolio and guidance for choosing problems that fit those topics. The Midterm Portfolio is due Tuesday, Feb 28 by Midnight and the Final Portfolio is due Monday, May 1 by 2PM.

There will be opportunities throughout the semester for you to ask questions and maintain progress toward completing the portfolio. The problems you choose cannot be from those whose solutions appear in the book or that have been previously graded. See the information sheet posted on Inquire for additional details.

Presentations: One of the goals for this course is to improve your ability to present mathematics orally. You will formally present solutions to problems twice in this class. First, you will choose a problem from your midterm portfolio and present it the week of Feb 27. Second, you will choose a problem from your final portfolio and present it on May 1 (final exam time slot). Each presentation should last approximately 5 minutes.

MCSP Conversation Series: The MCSP department and Roanoke College offer many opportunities to engage with mathematical ideas outside of classes. These co-curricular sessions engage the community to think about ongoing research, novel applications and other issues that face our discipline. Members of this class are encouraged to attend many of these activities, **however attending at least two is mandatory**.

Within one week of attendance, you must submit a brief response to the activity. This should not simply be a regurgitation of the content, but rather a personal contemplation of the experience. See Inquire for reflection prompt. These will be part of your Problem Set grade.

Additional participation (and submission of a reflection paper) will earn you extra credit, with .5% added to your course average for each attended, up to 2% total. In addition, individually, you may request that other appropriate events count.

MCSP Tea Time

Thursdays, 2:30 – 3:30PM

Trexler 271

A chance to chill with peeps while munching on cookies and sipping tea! Often cards make an appearance – or other games! Take an opportunity to relax, have fun, and hang with other students and professors!

RESOURCES

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at www.roanoke.edu/tutoring. If you have a question, feel free to stop by, or contact us at subject_tutoring@roanoke.edu or 540-375-2590. See you soon!

The Writing Center @ Roanoke College, located on the Lower Level of Fintel Library (Room 15), offers free tutorials focused on writing projects and oral presentations for students working in any field. Writers and presenters at all levels of competence may visit the Writing Center at any point in their process—including brainstorming, drafting, organizing, editing, or polishing presentation skills—to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 PM. Simply stop in, or schedule an appointment at www.roanoke.edu/writingcenter. Questions? Email writingcenter@roanoke.edu or call 540-375-4949.

Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in **Fintel Library**. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Becky Harman, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Becky Harman at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

Student Health & Counseling Services supports students through in-person health appointments, in-person counseling, 24/7 telehealth (TimelyCare), Therapy Assistance Online, as well as resources related to general wellness, LGBTQ+, sexual assault, substance abuse, and suicide prevention. Unmet health needs can negatively impact your performance in this course.

Student Health & Counseling Services can help. Please see https://www.roanoke.edu/shcs for more information and to access services.

Tentative Course Schedule **Note – Chapters 11 & 12 are Online

Week	Date	Sections	Topic	Items Due
Week 1	Jan 18	1.1-1.2	Intro & Exploration	
	Jan 20	1.4	Intro to Axioms	Problem Set 1
Neutral Geometry				
Week 2	Jan 23	1.5	Axiom Day 2	
	Jan 25	1.6	Euclid's Axiomatic Geometry	
	Jan 27	2.1	Angles / Lines / Parallels	Problem Set 2
Week 3	Jan 30	11.1-3	Hilbert's Axiomatic System Intro	
	Feb 1	11.3-4	Betweenness	
	Feb 3	11.5	Congruence Geometry	Problem Set 3
Week 4	Feb 6	11.5-7	Angle Order / Construction	
	Feb 8	11.7-8	Construction	
	Feb 10	11.8-9	Construction / Measuring	Problem Set 4
Week 5	Feb 13	11.10	Continuity & Parallelism	
	Feb 15	12.1-2	Parallelism	
	Feb 17	12.2	Continuity	Problem Set 5
Euclidean Geometry				
Week 6	Feb 20	2.1-2	Angles / Lines / Parallels / Triangles	
	Feb 22	2.4-5	Triangles / Pasch / Area	
	Feb 24	2.6	Circle Geometry	Problem Set 6
Week 7	Feb 27		**Euclidean Geometry Activity**	
	*Feb 28			**Midterm Portfolio**
	Mar 1		**Midterm Presentations – Day 1**	
	Mar 3		**Midterm Presentations – Day 2**	
SPRING BREAK!!!				
Transformational Geometry				
Week 8	Mar 13	5.1-2	Intro to Isometries / Reflections	
	Mar 15	5.3	Translations	

	Mar 17	5.4	Rotations	
Week 9	Mar 20	5.6	Glide Reflections	
	Mar 22		**Transf Geometry Activity**	Problem Set 7
Hyperbolic Geometry				
	Mar 24	7.1-2	Intro / Models	
Week 10	Mar 27	7.2-3	Models / Basic Results	
	Mar 29	7.4	Saccheri Quadrilateral	
	Mar 31	7.5	Lambert Quadrilateral / Triangles	Problem Set 8
Week 11	Apr 3		**Hyperbolic Geometry Activity**	
Elliptic Geometry				
	Apr 5	8.1-2	Intro	
	Apr 7		**Good Friday! No class**	
Week 12	Apr 10	8.3	Models	
	Apr 12	8.4	Basic Results	
	Apr 14	8.5	Triangles	Problem Set 9
Week 13	Apr 17		**Elliptic Geometry Activity**	
Fractal Geometry				
	Apr 19	10.1-2	Intro / Self-Similarity	
	Apr 21	10.3-4	Similarity Dimension	Problem Set 10
Week 14	Apr 24	10.6-8	Fractal Dim. / Algorithmic Geom.	
	Apr 25		**Fractal Geometry Activity**	
	May 1	2-5PM	**Final Presentations**	Final Portfolio (due before 2PM)