

## MATH 278, Spring 2019: Foundations of Geometry

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Class Meetings MWF: 9:40 AM - 10:40 AM in Bast 214

Office Hours Mon, Wed, Thurs, Fri: 2:00PM - 4:30PM  
By appointment only through <https://drmaggie.youcanbook.me/>

NOTE: You can book up to 3 days in advance but have to book at least 2 hours before the time slot. Email me if none of those times work.

Intended Learning Outcomes By the end of this course, successful 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; and identify the properties of isometries and dilations in several different contexts. Successful students will also be able to perform geometric constructions using software, and present complete geometric arguments orally and in writing.

Required Materials Textbook: *College Geometry: A discovery approach*; David C. Kay, 2nd Edition  
Other: GeoGebra, Spherical Easel software

Course Grades The following table lists the weights for the various forms of assessment for this class.

Homework/Quizzes	25%
Presentations (5% each)	15%
Tests (20% each)	40%
Final Exam	20%

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below. Attendance and class participation will be considered when determining marginal grades.

	B+	87-89	C+	77-79	D+	67-69		
A	94-100	B	83-86	C	73-76	D	63-66	F 0-59
A-	90-93	B-	80-82	C-	70-72	D-	60-62	

### Academic Integrity

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! Collaboration on presentations is required and permitted on homework. However, all homework solutions should be written up separately - you cannot copy a classmate's work or trade answers.

Cell phones must be turned off prior to entering the classroom. Laptops may be used for note-taking during regular class sessions, if this seems useful to you, but you may not log on to the internet or to an email server unless specifically told to do so. The use of laptops or any other electronic device, except for a calculator and/or GeoGebra, during an exam is strictly prohibited. This includes tablets, smart phones, and iPods. Any use of such devices during a quiz or exam will be considered a breach of academic integrity, again, unless it's for using GeoGebra.

**Reading and 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 section **before** the class meeting!

**Homework** Homework will be assigned regularly in this class (virtually every class period). It will be due at the start of the class period immediately following the assigning of homework. Typical problems will include constructions and calculations, informal arguments, and formal proofs. One to three problems will be graded for correctness (6 points), while the remainder will be graded for completion (4 points), for a total of 10 points.

**Quizzes** There may also be quizzes in this class. They may either be in-class quizzes or take-home quizzes. 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.

**Presentations** You will be responsible for presenting some of the material in this class. You should not start on the presentation the night before it is due! These will focus on more in-depth proofs or presenting new material not previously introduced to the class. Students will be in small groups (around 3 students per group) that will give 5-7 minute presentations about once a week. The presentations must be prepared as a group, but students will present the material on a rotating basis. Each group will also submit a written outline of the presentation or formal proof. Only the person presenting will receive a grade for the presentation, but the entire group will be graded on the written portion. You must present at least 2 times by the end of the semester.

**Biography Project** You will choose a *geometer* and give a presentation sharing details of their life. The last presentation of the semester will be your geometer presentations. See the end of the syllabus for more information. This presentation does not count toward the 2 required presentations for the semester.

**Tests & Final Exam** Two tests will be given (roughly according to the schedule on page 4) throughout the semester. Each test will focus on the material learned since the last test, but as with most mathematics classes, the exam will require you to understand and remember things from the past. These exams will be take-home with instructions given regarding outside material or help.

The final exam is comprehensive. It will be distributed the last Wednesday of class and due on Thursday April 25 by 5pm.

**MCSP Conversations** The Department of Math, Computer Science and Physics offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face our discipline.

Members of this class are invited to be involved with all of these meetings; however participation in **at least two** of these sessions is mandatory. After attending, students will submit a one page paper reflecting on the discussion to Inquire *within one week of the presentation*. This should **not** be a regurgitation of the content, but rather a personal contemplation of the experience. This reaction paper will be counted as a quiz. If you are caught leaving the talk early, you will receive a 0 on the assignment.

**Attendance &  
Make-Up Work**

Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. *When absent, excused or unexcused, you are responsible for all material covered in class. You will not be allowed to make up any work missed due to an unexcused absence.*

**Accessible  
Education  
Services**

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 Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at [aes@roanoke.edu](mailto: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 Laura Leonard at your earliest convenience to schedule an appointment.

**Subject Tutoring**

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm - 9 pm, Sunday - Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are highly trained Roanoke College students who offer one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences. Tutoring sessions are available in 15, 30, or 45-minute appointments. Feel free to drop by for a quick question or make an appointment at [https://libguides.roanoke.edu/subject\\_tutoring](https://libguides.roanoke.edu/subject_tutoring) for a longer one-on-one appointment. For questions or concerns, please contact us at 540-375-2590 or [subject\\_tutoring@roanoke.edu](mailto:subject_tutoring@roanoke.edu).

Tentative  
Course  
Schedule

Mon	Jan 14		Intro
Wed	Jan 16		<i>No class - cancelled!</i>
Fri	Jan 18		<i>No class - cancelled!</i>
Mon	Jan 21	2.3	Worksheet discussion & Incidence Axioms
Wed	Jan 23	2.4	Distance & Ruler Postulate
Fri	Jan 25	2.4 - 2.5	Rays & Angles
Mon	Jan 28		<i>Presentation #1</i>
Wed	Jan 30	2.5	Angle Measure & Protractor Postulate
Fri	Feb 1	2.6	Plane Separation & Interior of Angles
Mon	Feb 4		<i>Presentation #2</i>
Wed	Feb 6	2.6 - 3.1	Crossbar Theorem & Triangles
Fri	Feb 8	3.1 - 3.2	SAS & Taxicab Metric
Mon	Feb 11	3.3 - 3.4	Exterior Angles & Triangles Activity
Wed	Feb 13	3.4	Exterior Angle Theorem
Fri	Feb 15		<i>Presentation #3</i>
Mon	Feb 18	3.5 - 3.6	Inequality Theorems
Wed	Feb 20	3.6- 3.7	Congruence Criteria & Quadrilaterals
Fri	Feb 22	3.7 - 3.8	Quadrilaterals & Circles <i>Test 1 handed out</i>
Mon	Feb 25		<i>Presentation #4</i>
Wed	Feb 27	3.8	Circles
Fri	Mar 1	4.1	Euclidean Parallelism <b>Test 1 due</b>
<b>Spring Break</b>			
Mon	Mar 11	4.1 - 4.2	Rectangles & Parallelograms
Wed	Mar 13	4.3	Similar Triangles & Trig & Pythagorean Theorem
Fri	Mar 15		<i>No class - cancelled!</i>
Mon	Mar 18		<i>Presentation #5</i>
Wed	Mar 20	4.3 - 4.5	Polygons
Fri	Mar 22	4.5	Circles
Mon	Mar 25	4.8	Modern Geometry & Exploration of Triangles
Wed	Mar 27	6.1 - 6.2	Non-Euclidian Geometry
Fri	Mar 29	6.2 - 6.3	Angle Sum Theorem
Mon	Apr 1	6.4	Models for Hyperbolic Geometry
Wed	Apr 3		<i>Presentation #6</i>
Fri	Apr 5		Parallel Lines - how to construct <i>Test 2 handed out</i>
Mon	Apr 8		Parallel Lines
Wed	Apr 10	5.1 - 5.2	Plane Transformations & Reflections
Fri	Apr 12	5.2 - 5.4	Translations & Rotations <b>Test 2 due</b>
Mon	Apr 15	7.5	Isometries
Wed	Apr 17		Geometer Presentations <i>Final Exam handed out</i>
Fri	Apr 19		<i>No class - Good Friday</i>
Mon	Apr 22		Geometer Presentations
<b>Thur</b>	<b>Apr 25</b>		<b>Final Exam due by 5PM</b>

Commitment  
Hours

This course expects you to spend at least 12 hours of work each week inside and outside of class.

## Biography Project - for a Geometer

### Things to Include:

- Date and place of birth (& death, if applicable)
- Major achievements (include contributions to field of geometry)
- Education
- Work facts (where did they work, if they had a job & what they did)
- Interesting facts
- Other mathematicians they worked with
- Personal life - if there's anything interesting
- A picture or a letter from them or to them (if these exist)
- What was going on in the world during their life ? just to give a point of context (especially for the geometers from a long time ago)

### Ways to Communicate Above Details:

- WordPress/Blog-like approach
- Facebook page
- Collection of Memes
- Book
- Magazine article approach
- Etc.

Feel free to go past my ideas above, but let me know if you plan on doing that so I can make sure it'll work for this project. One rule - you cannot choose the same mathematician as someone else. The presentation should be between 4 and 6 minutes.