MATH 278, Spring 2017: Foundations of Geometry

Instructor: Dr. Maggie Rahmoeller
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Class Meetings
Tuesdays, Thursdays: 10:10 AM - 11:40 AM in Trexler 374

Office Hours
M/W 10:00-11:30AM
Thursdays: 1:00 - 3:00 PM and
by appointment (email me)

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	30%
Presentations	10%
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, 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.

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 takehome 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 5-10 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 3 times by the end of the semester.

Tests & Final Exam

Two tests will be given (roughly according to the schedule on page 3) 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 distributed the last day of class and due on Thursday April 27.

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 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. I will assume that if you accumulate 4 unexcused absences you are not interested in completing the course. After the 3rd unexcused absence, you, your advisor, and the registrar will be warned that another absence will result in your removal from the class (DF). *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.*

Tentative Course Schedule

Tue	Jan 17	1 – 2.2	Preliminaries, GeoGebra, Axioms and Proofs
Thu	Jan 19	2.2 – 2.4	Models, Incidence Axioms
Tue	Jan 24	2.4 – 2.5	Incidence Axioms, Distance *Presentation #1*
Thu	Jan 26	2.5 – 2.6	Ruler Postulate, Angle Measure, Protractor Postulate
Tue	Jan 31	2.6 – 3.1	Plane Separation, Crossbar Theorem *Presentation #2*
Thu	Feb 2	3.1 – 3.2	Triangles, SAS, Taxicab Metric
Tue	Feb 7	3.3 – 3.4	SAS, ASA, SSS, and Perpendicular Bisectors Exploration - Triangles
Thu	Feb 9	3.4 – 3.5	Exterior Angle Theorem, Inequality Theorems *Presentation #3*
Tue	Feb 14	3.6 – 3.7	Congruence Criteria, Quadrilaterals
Thu	Feb 16	3.8	Circles *Presentation #4*
Tue	Feb 21		*No class - Snow Day*
Thu	Feb 23	4.1 – 4.2	Euclidean Parallelism, Rectangles, Trapezoids **Test 1 due**
Tue	Feb 28	4.3 – 4.5	Similar Triangles, Trig, Pythagorean Theorem, Polygons
Thu	Mar 2	4.5 – 4.6	Circles, Area, & Volume *Presentation #5*
			Spring Break
Tue	Mar 14	4.8	Modern Geometry Exploration of Triangles
Thu	Mar 16	6.1 – 6.2	Non-Euclidean Geometry
Tue	Mar 21	6.3 – 6.4	Angle Sum and Models
Thu	Mar 23	7.1 – 7.2	Three-Dimensional Geometry *Presentation #6*
Tue	Mar 28	7.3 – 7.6	Cones, Volume, Spherical Geometry
Thu	Mar 30		*Presentation #7*
Tue	Apr 4	5.1 – 5.2	Plane Transformations & Reflections
Thu	Apr 6	5.2 – 5.4	Translations, Rotations, & other Transformations **Test 2 due**
Tue	Apr 11	5.5 – 5.7	Coordinate Characterizations, Transformation Theory
Thu	Apr 13	6.5	Circular Inversion in Non-Euclidean Geometry *Presentation #8*
Tue	Apr 18	7.5	Isometries in Three-Dimensional Geometry
Thu	Apr 20		Wrap-up & Review *Presentation #9*
Thu	Apr 27		**Final Exam due**

Commitment Hours

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