

MTE 553: Geometry

Spring 2017

3 credits

Instructor: Dr. Dibbs

Instructor: Rebecca Dibbs, PhD

E-Mail: Rebecca.Dibbs@tamuc.edu

Office: 303 Binnion

Office Hours: MTWR: 11-12; or by appointment

Class Meets: online

Texts: *Experiencing Geometry In Euclidean, Spherical, and Hyperbolic Spaces* by David W. Henderson

Course Materials: You want to have a sphere of some kind to look at when we study spherical geometry. Tennis balls work well, as do the plastic spheres often available at craft shops. You will also be creating a hyperbolic plane for this class

Course Description: This course is about geometry, but it is also a course about learning to develop and express your own mathematical ideas. It will emphasize ideas and imagination in addition to techniques and calculations. We will be investigating not only the planar Euclidean geometry that you probably studied in high school, but also geometry on spheres, cylinders, cones, pool tables, and other surfaces. We will try to imagine what geometry would be like for someone living on each of these surfaces. We will be studying these geometries not only because they are useful and can tell us surprising things about the world in which we live, but also because they are beautiful and fascinating subjects.

This course may be very different from most other math courses that you have taken. High school and introductory college math courses usually focus on teaching methods of doing computations: mathematics as finding the correct answer. In this course, we are going to focus on another kind of mathematics: mathematics as a way of thinking about and trying to understand the world. We'll try to understand how people decide what is true, and how they reason about mathematics and geometry in particular. We are going to focus on the process as much as the results of mathematical thought.

Writing is an important part of this process. Contrary to what some other math courses may have led you to believe, it is virtually impossible to do mathematics without writing about it. Writing is a tool for communicating ideas to other people, but it can also be used as a tool for clarifying one's own ideas. It can be very hard to spot a flaw in a line of reasoning if you haven't written it down; conversely, writing down a line of reasoning is often the best way to expose any problems that it might have. For these reasons, practicing mathematicians invariably use writing as a vital part of their work, and writing will be an integral part of this course.

This course will require a willingness to invest significant amounts of effort grappling with developing your own ideas. In this course, as in the real world, you will be the ultimate arbiter of what you believe to be true. Deciding for yourself what is true is not easy, but it can be very rewarding.

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Writing Assignments: Over the course of the semester, I will be assigning a series of problems for you to write about. Some of these will be informal writing assignments that will be graded only on how complete they are; others will be formal writing assignments, for which you will be expected to turn in a typewritten paper that will be graded not only on the completeness and correctness of your answer, but also on the clarity of your explanations. All of these problems will go through a process of revision: I will make comments on them, and then you will have an opportunity to revise them. You should explore each question and write out your thinking in a way that can be shared with others. Focus on your own ideas and understandings, and turn in whatever your thinking is on a question, even if only to say, "I do not understand such and such" or "I am stuck here." Be as specific as possible. Conjecture. Use pictures. Respond to my comments and questions. Only the final draft of the formal writing assignments will be graded. There will also be at least one major group project assigned during the semester that will make up a significant part of your final grade. There will also be a take home midterm and a final project

Grades: Your final grade will be computed from your final formal and informal assignment averages. The informal assignment average will be weighted to be 40% of your final grade, and the formal average will be 60% of your final grade. Letter grades will be given following a traditional grade breakdown.

Due dates: All assignments will have assigned initial due dates. Revisions of formal writing assignments will be due sixteen days after the previous draft, and only the final draft will be graded. Informal assignments can be revised as many times as you like; however, they should be substantially done within sixteen days of the original due date. Progress made after this date will count half as much as progress made before this date, unless the problem is at least 3/4 complete by then.

Hints for Success: The best approach is to strive for a solid understanding of the course topics and to accept at the start that this necessarily entails some struggling with ideas and feelings of frustration. The course problems take time, especially time to explore and think about the ideas. Often you will need to walk away for a while or for a day, and return to a problem for a second or third look before writing up your response. Expect this. However, do not get behind on the problems. Try to cultivate an approach that is a nice balance between "just getting it done" and avoiding it altogether. Stay connected, and come see me if you are having difficulties.

Group Work: We will often work in groups in this course. Whenever a group hands in a written assignment, they are required to put on the paper the names of those who participated fully, and only those names. Each person must sign the final copy. Your signature certifies that you participated equally in the project. It is dishonest to turn in work that is not solely and equitably the creation of the team members. You are not required to include on the report the name of someone who started but did not finish, or who did not contribute their share. Also, as the instructor I reserve the right to assign group members different grades if it doesn't appear that every contributed equally.

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Outside Sources: A central aim of this course is to help you learn to develop your own ideas about mathematical questions. You therefore should **NEVER** consult any reference materials outside of the course texts in answering questions for this course. This includes materials found on the internet. *The ideas that you present should be your own.*

Office Hours: My office hours are listed above, and will be held in 318 Binnion Hall. Please come see me! The best way to make an appointment or to get in touch with me for any other reason is to send me an email.

TECHNOLOGY REQUIREMENTS

Use of a graphing calculator having at least the capabilities of the TI-83 will be helpful throughout the course. TI-89 is highly recommended. A computer algebra system will be used for some problem exploration, enhanced conceptual understanding, and to engage students as active participants in the learning process.

COMMUNICATION AND SUPPORT

Interaction with Instructor Statement

My primary form of communication with the class will be through Email and Announcements. Any changes to the syllabus or other important information critical to the class will be disseminated to students in this way via your official University Email address available to me through MyLeo and in Announcements. It will be your responsibility to check your University Email and Announcements regularly.

Students who Email me outside of regular office hours can expect a reply within 24 hours M-F. Students who Email me during holidays or over the weekend should expect a reply by the end of the next regularly scheduled business day.

myLeo Support

Your myLeo email address is required to send and receive all student correspondence. Please email helpdesk@tamuc.edu or call us at 903-468-6000 with any questions about setting up your myLeo email account. You may also access information at <https://leo.tamuc.edu>.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures

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Academic Honesty

Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including (but not limited to) receiving a failing grade on the assignment, the possibility of failure in the course and dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. In **ALL** instances, incidents of academic dishonesty will be reported to the Department Head. Please be aware that academic dishonesty includes (but is not limited to) cheating, plagiarism, and collusion.

Cheating is defined as:

- Copying another's test or assignment
- Communication with another during an exam or assignment (i.e. written, oral or otherwise)
- Giving or seeking aid from another when not permitted by the instructor
- Possessing or using unauthorized materials during the test
- Buying, using, stealing, transporting, or soliciting a test, draft of a test, or answer key

Plagiarism is defined as:

- Using someone else's work in your assignment without appropriate acknowledgement
- Making slight variations in the language and then failing to give credit to the source

Collusion is defined as:

- Collaborating with another, without authorization, when preparing an assignment

If you have any questions regarding academic dishonesty, ask. Otherwise, I will assume that you have full knowledge of the academic dishonesty policy and agree to the conditions as set forth in this syllabus.

Late Policy: Late work/Make-ups will not be accepted without a documentable and valid excuse, because the lowest grade(s) in each category is dropped. Examples of documentable and valid excuses include:

- *car accident w/ police report
- *illness w/ doctor's note (you or your child)
- *athletic or other mandatory extra-curricular travel
- *field trip for another class
- *being detained upon entering the country by Homeland Security

University Specific Procedures

- The final exam time can be found at <http://www.tamuc.edu/admissions/registrar/academicCalendars/final-exam-schedule.aspx>
- Campus Concealed Carry (new): Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in

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the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to (<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

- The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148, email: StudentDisabilityServices@tamuc.edu
- Basic Tenets of Common Decency: "All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment." (Student's Guide Handbook, Policies and Procedures, Conduct.) This means that rude and/or disruptive behavior will not be tolerated.
- A&M-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.
- Tutoring services up to the level of Calculus I provided by the Math Skill Center (Binnion Room 328) with the following hours: MW, 8am–8pm; TR, 8am–6pm; and F 8am–12pm.

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Week of...	Reading/Pencasts	Assignment	Due
1/15	Chapter 1	Problem 1.1	1/21
1/22	Chapter 2	Problem 2.1	1/28
1/29	Neutral Geometry	NG worksheets	2/4
2/5	Chapter 3	Problems 3.2 & 3.2	2/11
2/12	Introduction to Euclid's Postulates	Postulates paper	2/18
2/19	Chapter 4	Problem 4.1	2/25
2/26	Chapter 5	Hyperbolic Plane Due; Problem 5.1	3/4
3/5	Chapter 6	Problems 6.1, 6.2 (a) & 6.4 Start Midterm (Ch 1-5, NG, Postulates)	Ch 6: 3/11 Midterm: 3/21
3/12	None	Midterm (Ch 1-5, NG, Postulates)	Midterm: 3/21
3/19	Ch 7	Problems 7.1, 7.2 & 7.3	3/25
3/26	Ch 8	Problems 8.2 & 8.3	4/1
4/2	None	MTE Project	4/8
4/9	Ch 9	2 of 9.1 – 9.4	4/15
4/16	Ch 10	Problem 8.4, 10.1	4/29
4/30	None	Work on final project	5/12
5/7	None	Final project	5/12

Note: Bold = Formal assignment (no revisions)

No Bold – informal assignment (up to two revisions)