

MATH 4327: Readings and Research

Sul Ross State University ~ Rio Grande College
Spring 2017

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Course Description MTH 4327 is intended as an introduction to individual study and research and to oral and written communication in mathematics.

Course Objectives Students will explore a higher-level humanistic mathematical topic of their own choice; develop independent study techniques; practice presenting mathematical content to an audience of academic peers; prepare a formal expository paper; and deliver a formal oral presentation to a mixed audience.

Mathematics Program Student Learning Outcomes The student will (1) be able to demonstrate content knowledge in the foundations of mathematics, including discrete mathematics and geometry, (2) be able to research a humanistic mathematical topic and communicate their knowledge in writing, and (3) be able to research a humanistic mathematical topic and communicate their knowledge orally.

Class Time Monday and Wednesday, 2:00 – 3:15 p.m.

Class Location Del Rio 107; Eagle Pass B112; Uvalde B114c

Required Text H. S. M. Coxeter, *Introduction to Geometry*, Second Edition, ISBN 9780471504580

Office Hours M/W 11:30 – 2:00; T/Th 2:00 – 4:30

Course Policies

Reading and Participation

At the beginning of the semester, each student will select a section of the text. This will typically consist of about two connected chapters. Possibilities include:

- Euclidean Geometry and Beyond: Chapter 1, Sections 2.1-2
- Isometry and Symmetry: Sections 2.3 – 2.8, Chapter 3
- Tessellations and Regular Solids: Chapter 4, Sections 10.1 – 10.3
- Inversive Geometry: Chapter 6
- The Platonic Solids: Chapters 10 – 11
- Coordinates and Curves: Chapter 8, Chapter 17
- Topology of Surfaces: Sections 10.1 – 10.3, Chapter 21
- Three-Dimensional Geometry: Sections 10.1 – 10.3, Chapter 22

Once we decide which part you would like to work on, this will be your focus for the semester. You should begin by reading the chapters. Plan on working through one to two sections per week. You should work most of the exercises you come across.

Usually, when we meet as a class, students will take turns communicating what they have been working on. Typically two students will present during each class period, but other students are expected to listen carefully and courteously, participate, ask questions, etc. This is intended to be an informal back-and-forth, like office hours, and not a lecture.

Typically, you should plan on summarizing what you've read by writing some things out for everyone to see, working through proofs or computations, etc., and then working an exercise or two. Always make sure to bring plenty of paper! If you want to present a complete or partial solution, it's better to rewrite it and explain each step than to just stick your notebook under the document camera. This helps me and everyone else understand your thought process.

The first time you present, plan on giving an overview (about twenty minutes or so) of your chosen section. You should skim through your chapters and sections carefully enough to describe what they're about without going into details. The goal is to give **yourself** a general idea of where you're headed.

When it's your day to go, it's okay if you mostly have questions about the material, got stuck on exercises, etc. This is a time to learn and to practice communication. Your fellow students may have ideas, and I will get up there to help explain things myself sometimes. If you're needing assistance on an exercise, I will probably try to guide you through it rather than writing something up myself.

The course is self-directed and requires some maturity; my role is that of a guide, not an instructor. It's *crucial* that you adhere to the following two guidelines:

WORK THROUGH ONE OR TWO SECTIONS EVERY WEEK

READING WITHOUT WORKING EXERCISES IS POINTLESS

Your participation grade will depend on whether you seriously grapple with the material, attempt exercises and work on them until you get them right, come to class prepared to discuss your material, and take part in discussions with other students.

Research Paper

In addition to keeping up with the assigned readings, you are required to write an expository paper. The purpose of such a paper is to inform, describe, or explain. Your paper should be based on a topic encountered in your chosen section of the Coxeter textbook. However, it should not be a textbook review or summary. The focus of your paper should be your topic, not the book.

The topic you focus on needn't encompass all the material you work through during the semester. In fact, it should be fairly narrow, so that your paper has a clear focus. But it should also be broad enough that you are able to write an entire paper on that topic alone.

Begin your paper by researching your topic. Your paper should make use of at least three cited references. One of these may be the Coxeter textbook. Some restrictions apply; please see the attached guidelines for more information.

Oral Presentation

You will also be required to deliver an hour-long oral presentation based on your research paper. This can be thought of as a popular exposition. You can use the document camera or prepare a PowerPoint presentation. Your presentation should also make use of visual aids such as images, models, prepared diagrams, or demonstrations. We will tentatively schedule your presentations to take place in class during the last weeks of class, although we can be somewhat flexible in this regard. You can expect a modestly sized audience of math students and professors, and should be prepared to field questions from the audience after your presentation.

Timeline

Here is a tentative timeline for due dates. Subject to change.

Date	Assignment	Description
January 23	Section Selection	Choose section of textbook to focus on. Notify me in class or by e-mail.
February 10	Topic Approval	Select a topic from your chosen section to focus on for your paper and oral presentation. Notify me by e-mail.
March 3	Source Narrative	Write a short but complete account of how you chose and acquired your sources. You should have a working list of sources well before this date; the sources should be in your hands by this date. Your narrative should include your final list of sources. Submit on Blackboard.
March 10	Thesis Statement	See the attached guidelines for information on how to write a thesis statement. Submit your statement to me by e-mail. Expect it to be modified somewhat.
March 24	Outline	See the attached guidelines for information on how to write an outline for an expository paper. Be as detailed as you can. Submit on Blackboard.
April 7	Introduction	Submit your first draft for your paper's introduction on Blackboard. Your thesis statement should appear somewhere in the introduction.
April 28	Paper	Submit the final draft of your paper on Blackboard. It is recommended that you submit several rough drafts to me as you work on your paper.
TBA	Oral Presentation	Deliver your oral presentation before an audience of undergraduate students and mathematics faculty.

Rubrics

The grading rubrics agreed upon by the mathematics faculty of Rio Grande College will be provided for your convenience. These will be used to score your written paper and oral presentation.

Grading Policy

Your grades will be weighted as follows:

Participation	40%
Research Paper	30%
Oral Presentation	30%

Participation will be scored out of 40 points, distributed as follows:

Independent Study	10
Daily Participation	10
Source Narrative	5
Thesis Statement	5
Outline	5
Introduction	5
Total	40

The research paper and oral presentation will each be scored out of 20 points. The grading rubrics agreed upon by the mathematics faculty of Rio Grande College will be provided for your convenience.

A student who averages at least 90% will receive an A; at least 80% will receive at least a B; at least 70% will receive at least a C; at least 60% will receive at least a D.

Americans With Disabilities Act

Sul Ross State University is committed to equal access in compliance with the Americans With Disabilities Act of 1973. It is the student's responsibility to initiate a request for accessibility services. Students seeking accessibility services must contact Kathy Biddick, Student Services Administrative Secretary.