MATH 5305: Advanced Geometry

Sul Ross State University
Fall 2021

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Course Description	MTH 5305 is intended as an introduction to classical geometry from an advanced viewpoint, including Euclidean geometry, axiomatic systems, constructability, regular polytopes, projective geometry, and non-Euclidean geometry.
Class Meetings	Wednesday, 6:00 – 8:45
Class Location	Virtual Meetings (Blackboard Collaborate)
Required Texts	The required textbook is Robin Hartshorne, *Geometry: Euclid and Beyond*, ISBN 9781441931450. You will need also access to a version of Euclid's *Elements*. There are inexpensive editions on the market. Electronic versions will also be made available on Blackboard.
Office Hours	M/W/Th 12:00 – 2:00, 3:15 – 4:30 (Uvalde); T 3:15 – 4:30 (Eagle Pass); or by appointment; or basically whenever I'm not busy

Course Policies

Attendance Policy

The class will meet online at scheduled times using web conferencing. Attendance at these meetings is mandatory and contributes toward your participation grade.

Communication

The Blackboard system will be used to provide course materials, submit assignments, and post grades. You are welcome to e-mail, call, or text me at any time. My cell number is **(830) 333-0164**. Please identify yourself in your text or voicemail. Please make sure to check the e-mail address associated with Blackboard on a regular basis.

Grading Policy

Your grades will be weighted as follows:

Participation	10%
Homework	60%
Final Exam	30%

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.

Homework

Each week you will be provided with a reading assignment consisting of one or two sections and corresponding sets of exercises from the textbook. It is your responsibility to carefully read the selections and contact me or your classmates if you have questions. Exercises will be prepared as Microsoft Word documents and turned in via Blackboard.

Homework will be due by midnight on the Sunday of the week it is assigned.

Exams

The comprehensive final exam will take place at the time scheduled by the university, during the final exam period from December 3 – 8. Official time and date to be announced once the university publishes the final exam schedule.

Subject Outline

I. Euclid's Geometry (Hartshorne Chapter 1, Sections 1 – 4): *Euclid's Elements – ruler and compass constructions – Euclid's axiomatic method – the regular pentagon*

II. Hilbert's Axioms (Hartshorne Chapter 2, Sections 6 – 11): *axioms of incidence – axioms of betweenness – axioms of congruence – Hilbert planes – intersections*

III. Geometry over Fields (Hartshorne Chapter 3, Sections 13 – 16): *the real Cartesian plane – fields and incidence – ordered fields and betweenness – congruence*

IV. Construction Problems and Field Extensions (Hartshorne Chapter 6, Sections 28 – 29): *three famous problems – the regular 17-gon*

V. Area (Hartshorne Chapter 5, Sections 22 – 25): *area in Euclid's geometry – measure of area functions – dissection – quadratura circuli*

VI. Non-Euclidean Geometry (Hartshorne Chapter 7, Sections 33 – 35, 37, 39 – 40): *history of the parallel postulate – neutral geometry – archimedean neutral geometry – non-euclidean area – circular inversion – the Poincare model – hyperbolic geometry*

Schedule

This schedule is tentative only. The chapter and section numbers refer to Hartshorne.

August 25 – September 1	Section 1
September 1 – 8	Section 2
September 8 – 15	Sections 3 – 4
September 15 – 22	Sections 6 – 7
September 22 – 29	Sections 8 – 9

October 29 – 6	Sections 10 – 11
October 6 – 13	Section 13
October 13 – 20	Sections 14 – 15
October 20 – 27	Section 28 – 29
October 27 – November 3	Section 22 – 23
November 3 – 10	Sections 24 – 25
November 10 – 17	Sections 33 – 34
November 17	Chapter 35, 37
December 1	Chapter 39 – 40

University Statements

SRSU Disabilities Services: *Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. RGC students seeking accessibility services should contact Paulette Harris, Executive Assistant to the Vice President and Dean, at 830-279-3023 or email pharris@sulross.edu. Ms. Harris's office is at 2623 Garner Field Road, Uvalde, TX 78801 (this is the mailing address, too).*

University Libraries: *The Sul Ross Library offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, library.sulross.edu. SRSU RGC students may request InterLibrary Loans (ILLs) and book check outs from the Sul Ross Library to be picked up at the SWTJC library that is most convenient. Access requires your LoboID and password. Librarians are a tremendous resource for your coursework and can be reached in person, by email (srsulibrary@sulross.edu), or phone (432-837-8123).*

The Southwest Texas Junior College (SWTJC) Library is also available on each campus for your physical use of the space or checking out books. Del Rio, Eagle Pass, and Uvalde students may use online resources available through SWTJC website, library.swtjc.edu. These libraries serve as pickup locations for your ILL or Document Delivery or book requests; to do so, choose the appropriate pick-up location when requesting materials from the Alpine campus.