

MTH 5309: Advanced Algebra

Sul Ross State University

Spring 2022

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Course Description Introduction to modern abstract algebra, including groups, rings, integral domains and fields, Galois theory, and related topics.

Class Meetings Wednesday, 6:00 – 8:45.

Class Location Virtual meeting.

Required Texts *Abstract Algebra*, Dummit and Foote, 9780471433347

Course Policies

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. Homework can be submitted in a variety of formats, but each assignment must be submitted as a single file that I can view and grade on Blackboard.

One possibility would be to type up your homework using the Equation Editor on Microsoft Word and save it as a PDF. Another would be to capture high-quality images of your homework using a phone or other device and combine into a single file, e.g. by pasting each image into a word processor file. Feedback will be provided in the form of comments your Blackboard file.

All work must be shown for full credit. Try to be as tidy as possible so that I can understand your work. I'm flexible as to file format provided I can view your submission on Blackboard. Submissions consisting of multiple image files will not be graded as it's too easy for me to lose my place and miss something. If I have trouble seeing your file, I will let you know and give you a chance to resubmit.

Exams

The final exam is scheduled by the university for Tuesday, May 3, from 6:00 – 8:00 p.m. The final exam will be comprehensive.

Subject Outline

Below is a tentative outline of the subjects we will cover in this course.

- I. Introduction to Groups: *basic axioms and examples – dihedral groups – symmetric groups – matrix groups – the quaternion group – homomorphisms and isomorphisms – group actions*
- II. Subgroups: *definitions and examples – centralizers and normalizers – stabilizers and kernels – cyclic groups and cyclic subgroups – subgroups generated by subsets of a group – the lattice of subgroups of a group*
- III. Quotient Groups and Homomorphisms: *definitions and examples – cosets and Lagrange's theorem – isomorphism theorems – transpositions and the alternating group*
- IV. Group Actions: *groups actions and permutation representations – groups acting on themselves by left multiplication – groups acting on themselves by conjugation*
- V. Introduction to Rings: *basic definitions and examples – polynomial rings matrix rings, group rings – ring homomorphisms and quotient rings – ideals – rings of fractions – the Chinese remainder theorem*
- VI. Euclidean Domains, Principal Ideal Domains, and Unique Factorization Domains: *Euclidean domains – principal ideal domains – unique factorization domains*
- VII. Polynomial Rings *definitions and basic properties – polynomial rings over fields – polynomial rings that are UFDs – irreducibility – more on polynomial rings over fields*

Schedule

This schedule is tentative only. The section numbers refer to the outline above.

Unit I	January 12 – 26
Unit II	January 26 – February 16
Unit III	February 16 – March 2

Spring Break	March 7 – 11
Unit IV	March 16 – 30
Unit V	March 30 – April 6
Unit VI	April 6 – 20
Unit VII	April 20 – 27
Final Exam	May 3

University Statements

Distance Education Statement: *Students enrolled in distance education courses have equal access to the university's academic support services, such as library resources, online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires secure login. Students enrolled in distance education courses at Sul Ross are expected to adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website. Directions for filing a student complaint are located in the student handbook.*

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.