

Syllabus - MATH 5317

Introduction to Modern Algebra

Spring 2025

Instructor Information

Name: Dr. Dermot McCarthy

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Office Hours: TR 10:00-10:50 am in Mathematics 247.

Note: The best way to contact me is via e-mail. Please e-mail me from your TTU account. Include the course number and your full name in any e-mail that you send to me.

Course Information

Class Times and Room: TR 12:30-1:50 pm in Mathematics 115.

Prerequisites: None.

Textbook (optional): *Abstract Algebra*, third edition, by Dummit and Foote, published by Wiley.

Course Description and Purpose

This is a graduate level introduction to the theory of groups and rings. It prepares the student for the graduate algebra sequence Modern Algebra I & II (Math 5326-5327), and the textbook is the same as the one used for that sequence. Students with a solid background in abstract algebra can go directly to Math 5326-5327.

Course Learning Outcomes

The students will develop the skills in basic group theory and ring theory that are required to succeed in the Math 5326-5327 sequence. After completion of the class, students will have an operational understanding of the basic concepts in group theory and ring theory, including the following:

- Important examples of groups, such as dihedral groups and matrix groups;
- Subgroups and quotient groups;
- The group isomorphism theorems;
- Group actions, centralizers, normalizers, and stabilizers;
- Important examples of rings, such as polynomial rings, matrix rings, and group rings;
- The ring isomorphism theorems;
- Rings of fractions; and
- The Chinese Remainder Theorem.

Learning Assessment

Learning outcomes will be assessed through class participation, homework assignments and a written exam.

Attendance: Class attendance is mandatory, except in the case of an excused absence (see section below on student absences).

Homework: Written homework will be assigned throughout the semester. There will be 6 such assignments in total. Late homework will not be accepted.

Final exam: There will be two exams: a midterm given during class, roughly halfway through the semester; and a final exam which will take place on Friday May 9th, 1:30 pm - 4:00 pm in our regular classroom.

Grading

A student's overall percentile grade for the course will be calculated based on his/her percentile grade in each of the assessment categories described above, weighted as follows:

Homework	30%
Class attendance	10%
Midterm exam	30%
Final exam	30%

Letter grades will then be assigned in accordance with the following correspondence:

Letter grade A = a percentile grade of 90% or higher

Letter grade B = a percentile grade of 80% or higher, that is lower than 90%

Letter grade C = a percentile grade of 70% or higher, that is lower than 80%

Letter grade D = a percentile grade of 60% or higher, that is lower than 70%

Letter grade F = a percentile grade lower than 60%

Academic Integrity

Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Texas Tech University ("University") Quality Enhancement Plan, Academic Integrity Task Force, 2010].

Accommodation for Students with Disabilities

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in Weeks Hall or call 806-742-2405.

Accommodation for Pregnant Students

Any pregnant student will be provided reasonable accommodations as would be provided to a student with a temporary medical condition including:

- ability to maintain a safe distance from hazardous substances, areas, or activities;
- excused absences;
- ability to make up missed assignments or assessments;
- additional time for assignment completion; and access to instructional materials and recordings of classes for which the student has an excused absence.

Any student who is pregnant or parenting a child up to age 18 may contact Texas Tech's designated Pregnancy and Parenting Liaison to discuss support available through the University. The Liaison can be reached by emailing titleix@ttu.edu or calling 742-7233. Additional information is available online at <https://www.depts.ttu.edu/titleix/PregnacnyandParenting/index.php>.

Student Absences

Observation of Religious Holy Days: "Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

Officially Approved Trips and Excused Absences: A student who misses an examination or is unable to complete an assignment due to an officially approved trip or an excused absence (e.g. illness) will be allowed to make-up the missed examination or assignment within a reasonable timeframe thereafter. Students should notify the instructor of any such absences as soon as is possible. The student should be able to provide official evidence to support the reason for their absence (e.g. a doctor's note in the case of illness).

Unexcused Absences: Make-up of examinations or assignments will not be allowed in the case of unexcused absences.

Civility in the Classroom

Texas Tech University is a community of faculty, students, and staff sharing an expectation of cooperation, professionalism, and civility in all forms of university communication and business. This expectation applies to all interactions in a classroom setting where an exchange of ideas and creative thinking should be encouraged and where intellectual growth and development are fostered. Disruptive students may be subject to sanctions according to the *Texas Tech University Code of Student Conduct*. Faculty members are also expected to maintain the highest standards of professionalism in all interactions with all constituents of the university (www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php).

Texas Tech Policies Concerning Academic Honesty, Special Accommodations for Students with Disabilities, Student Absences for Observance of Religious Holy Days, and Accommodations for Pregnant Students are updated regularly. For the most up-to-date versions please see <https://www.depts.ttu.edu/tlpdc/RequiredSyllabusStatements.php>