MATH 5330 - Abstract Algebra I

Fall 2026 Syllabus, Section 162, CRN 19408

Instructor Information

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Office Hours:
MTWR 10:30-11:30 AM, or by appointment
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Times and Location

MW 6pm-7:20pm in Western Hemispheric Trade Ctr 104

Course Description

This is the first course in Abstract Algebra. The main topics in this course will be groups, rings, fields, subgroups, quotient groups, ideals, homomorphisms and introduction to field extensions. There will be classical examples of permutation groups, polynomial rings and integral domains, questions of factorization, ideals and fundamental homomorphism theorems. Prerequisite: Graduate standing and consent of instructor.
Mathematics & Physics Department, College of Arts & Sciences

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1. **Explain** fundamental concepts, definitions, and theorems of abstract algebra, including groups, subgroups, cyclic groups, permutation groups, cosets, quotient groups, homomorphisms, rings, integral domains, and fields.
2. **Apply** algebraic definitions, theorems, and techniques to solve computational and theoretical problems involving groups and rings.
3. **Construct** rigorous mathematical proofs using definitions, lemmas, theorems, and appropriate proof strategies.
4. **Analyze** algebraic structures and their relationships through subgroups, normal subgroups, quotient groups, homomorphisms, isomorphisms, and group actions.
5. **Evaluate and construct** mathematical arguments, examples, and counterexamples to determine the validity of conjectures and distinguish among related algebraic concepts.
6. **Synthesize and communicate** abstract mathematical reasoning effectively by writing clear, logically structured proofs and explanations using appropriate algebraic notation and terminology.

Important Dates

Visit the Academic Calendar (tamiu.edu) (https://www.tamiu.edu/academiccalendar/) page to view the term's important dates.

Textbooks

Group	Title	Author	ISBN
Required	Contemporary Abstract Algebra	Joseph A. Gallian	978-1-305-65796-0

Grading Criteria

GRADE	PERCENTAGE
A	91-100
B	80-90.9
C	70-79.9
D	60-69.9
F	Below 60

Methodology & Grade Distribution

Class Routine

- Attendance for all classes is required in person.

On each non-exam day, we might go over: a warm-up problem, lecture notes, classwork, Bonus Points, and/or a Quiz.

- **Classwork (0%)**: The Daily Classwork consists of problems based on the material covered in class that day. The goal of the Daily Classwork is to help you master the course material, reinforce your understanding of the concepts, and prepare you for the quiz problems.

- **Quizzes (20%)**: The Quizzes will be based on the assigned study problems and will consist of one or more problems.
  - Practice problems will be posted on Blackboard before each quiz to help you prepare.
  - A total of 5 quizzes will be given throughout the semester, and each quiz is worth 25 points. If you miss a quiz, you will receive a score of zero for that quiz. However, your lowest quiz score will be dropped at the end of the semester. There will be no make-up quizzes.
  - You may take each quiz with a partner if you wish. The purpose of allowing partner quizzes is to encourage group study, collaboration, and deeper discussion of the concepts covered in the course.

- **Bonus Points (UP to 6% EC):** Bonus Point problems will be based on the material covered in class that day. The goal of the daily Bonus Points is to help you master the material, strengthen your understanding of the concepts, and feel prepared to solve the practice problems. In addition, these activities provide an opportunity to earn extra credit toward your final grade.
  - Bonus Point problems will be collected and graded.

Blackboard

It is your responsibility to log in regularly to Blackboard to access course materials, practice problems, Presentation Project information, and announcements.

On Blackboard, you will find:

- Practice problems related to the material covered in class. These problems are intended to help you review the concepts, practice the methods and techniques discussed in class, and prepare for quizzes and exams.
  - You are encouraged to work with classmates and participate in group study when solving the practice problems. You may also use resources such as the internet or AI tools to support your learning. However, you should use these resources carefully and critically, as online sources and AI tools may sometimes provide incorrect solutions or explanations. Always verify that the methods and answers are consistent with the concepts and techniques discussed in class.
  - The goal is for you to practice, apply, and master the concepts we have covered. If you encounter difficulties or are unsure about a solution, please ask questions during office hours or seek guidance in class.
    - Please note that questions about quiz preparation should be addressed in class before the day of the quiz.
- Information and details about: Graduate Abstract Algebra I _ Presentation Project
- Exam answer keys, grades, the syllabus, and other course documents.

Category	Percentage
Quizzes	20%
Presentation	15%
Exam1	22%
Exam2	22%
Final Exam	21%

Adjustments to the schedule may be made as necessary throughout the course

Week of	Agenda/Topic	Reading(s)	Due
8/24	Syllabus Preliminaries: integers, modular arithmetic, & equivalence relations Introduction to dihedral groups	Ch 0-1 Review proof techniques and introduce algebraic structures through symmetry	
8/31	Groups: definitions, examples, elementary properties	Ch 2 Definitions, axioms, examples, proof techniques	
9/7	9/7 Labor Day- University closed 9/9 Finite groups and subgroups; subgroup tests	Ch 3 Determine and prove whether subsets are subgroups	
9/14	Cyclic groups; generators; classification of subgroups of cyclic groups	Ch 4 Structure of cyclic groups and subgroup relationships	Quiz 1 - Monday 9/14
9/21	Permutation groups; cycle notation; properties of permutations	Ch 5 Analyze permutations and use them to represent groups	
9/28	Isomorphisms; Cayley's Theorem; automorphisms	Ch 6 Analyze when algebraic structures have the same structure	Quiz 2 - Monday 9/28
10/5	Cosets; Lagrange's Theorem; applications	Ch7 Use cosets and Lagrange's Theorem to derive structural results	
10/12	External direct products; applications;	Ch 8 Construct larger groups from known groups; integrate group-theoretic ideas	Quiz 3 - Monday 10/12
10/19	Normal subgroups; factor groups; internal direct products	Ch 9 Construct and analyze quotient groups	Exam 1 - Monday 10/19
10/26	Group homomorphisms; kernels and images; First Isomorphism Theorem	Ch 10 Analyze structure-preserving maps	
11/2	Introduction to rings; examples; subrings; integral domains; fields	Ch. 12-13 Transfer structural ideas from groups to rings	Quiz 4 - Monday 11/2
11/9	Ideals; factor rings; prime and maximal ideals; ring homomorphisms	Ch. 14-15 Develop quotient constructions in ring theory	
11/16	Presentations		Presentations Course Evaluations.
11/23	Comprehensive review; synthesis of group and ring theory Wednesday 11/25 Reading Day No Classes	Ch. 1-15	Quiz 5 - Monday 11/23
11/30			Exam 2 - Monday 11/30
12/7	Final Exam (Comprehensive) 6:00 - 8:00 pm		Final Exam - Monday 12/7

University/College Policies

Please see the University Policies below.

COVID-19 Related Policies

If you have tested positive for COVID-19, please refer to the Student Handbook, Appendix A (Attendance Rule) for instructions.

Required Class Attendance

Students are expected to attend every class in person (or virtually, if the class is online) and to complete all assignments. If you cannot attend class, it is your responsibility to communicate absences with your professors. The faculty member will decide if your excuse is valid and thus may provide lecture materials of the class. According to University policy, acceptable reasons for an absence, which cannot affect a student's grade, include:

- Participation in an authorized University activity.
- Death or major illness in a student's immediate family.
- Illness of a dependent family member.
- Participation in legal proceedings or administrative procedures that require a student's presence.
- Religious holy day.
- Illness that is too severe or contagious for the student to attend class.
- Required participation in military duties.
- Mandatory admission interviews for professional or graduate school which cannot be rescheduled.

Students are responsible for providing satisfactory evidence to faculty members within seven calendar days of their absence and return to class. They must substantiate the reason for the absence. If the absence is excused, faculty members must either provide students with the opportunity to make up the exam or other work missed, or provide a satisfactory alternative to complete the exam or other work missed within 30 calendar days from the date of absence. Students who miss class due to a University-sponsored activity are responsible for identifying their absences to their instructors with as much advance notice as possible.

Classroom Behavior (applies to online or Face-to-Face Classes)

In the classroom, students are expected to listen attentively, participate respectfully, and adhere to established rules. Behavior that interferes with the class lecture may result in disciplinary action, ensuring a productive and respectful learning environment for everyone. Any disputes over academic matters should be addressed calmly and constructively, ideally during designated times such as office hours or after class. If a student does not agree with a decision, they can request a meeting with the instructor to discuss their concerns in more detail. Should further resolution be needed, the student may escalate the matter to the department head or use formal grievance procedures as outlined in the sections below. (please refer to Student Handbook Article 4 (https://www.tamiu.edu/handbook/article-04.shtml)).

TAMIU Honor Code: Plagiarism and Cheating

As a TAMIU student, you are bound by the TAMIU Honor Code to conduct yourself ethically in all your activities as a TAMIU student and to report violations of the Honor Code. Please read carefully the Student Handbook Article 7 and Article 10 available at Student Handbook (https://www.tamiu.edu/handbook/index.shtml).

We are committed to strict enforcement of the Honor Code. Violations of the Honor Code tend to involve claiming work that is not one's own, most commonly plagiarism in written assignments and any form of cheating on exams and other types of assignments.

Plagiarism is the presentation of someone else's work as your own. It occurs when you:

1. Borrow someone else's facts, ideas, or opinions and put them entirely in your own words. You must acknowledge that these thoughts are not your own by immediately citing the source in your paper. Failure to do this is plagiarism.
2. Borrow someone else's words (short phrases, clauses, or sentences), you must enclose the copied words in quotation marks as well as citing the source. Failure to do this is plagiarism.
3. Present someone else's paper or exam (stolen, borrowed, or bought) as your own. You have committed a clearly intentional form of intellectual theft and have put your academic future in jeopardy. This is the worst form of plagiarism.

Here is another explanation from the 2020, seventh edition of the Manual of The American Psychological Association (APA):

"Plagiarism is the act of presenting the words, idea, or images of another as your own; it denies authors or creators of content the credit they are due. Whether deliberate or unintentional, plagiarism violates ethical standards in scholarship" (p. 254). This same principle applies to the illicit use of AI.

Plagiarism: Researchers do not claim the words and ideas of another as their own; they give credit where credit is due. Quotations marks should be used to indicate the exact words of another. Each time you paraphrase another author (i.e., summarize a passage or rearrange the order of a sentence and change some of the words), you need to credit the source in the text. The key element of this principle is that authors do not present the work of another as if it were their own words. This can extend to ideas as well as written words. If authors model a study after one done by someone else, the originating author should be given credit. If the rationale for a study was suggested in the discussion section of someone else's article, the person should be given credit. Given the free exchange of ideas, which is very important for the health of intellectual discourse, authors may not know where an idea for a study originated. If authors do know, however, they should acknowledge the source; this includes personal communications (p. 11). For guidance on proper documentation, consult the Academic Success Center or a recommended guide to documentation and research such as the Manual of the APA or the MLA Handbook for Writers of Research Papers. If you still have doubts concerning proper documentation, seek advice from your instructor prior to submitting a final draft.

TAMIU has penalties for plagiarism and cheating.

- **Penalties for Plagiarism**: Should a faculty member discover that a student has committed plagiarism, the student should receive a grade of 'F' in that course and the matter will be referred to the Honor Council for possible disciplinary action. The faculty member, however, may elect to give freshmen and sophomore students a "zero" for the assignment and to allow them to revise the assignment up to a grade of "F" (50%) if they believe that the student plagiarized out of ignorance or carelessness and not out of an attempt to deceive in order to earn an unmerited grade; the instructor must still report the offense to the Honor Council. This option should not be available to juniors, seniors, or graduate students, who cannot reasonably claim ignorance of documentation rules as an excuse. For repeat offenders in undergraduate courses or for an offender in any graduate course, the penalty for plagiarism is likely to include suspension or expulsion from the university.
  - *Caution*: Be very careful what you upload to Turnitin or send to your professor for evaluation. Whatever you upload for evaluation will be considered your final, approved draft. If it is plagiarized, you will be held responsible. The excuse that "it was only a draft" will not be accepted.
  - *Caution*: Also, do not share your electronic files with others. If you do, you are responsible for the possible consequences. If another student takes your file of a paper and changes the name to his or her name and submits it and you also submit the paper, we will hold both of you responsible for plagiarism. It is impossible for us to know with certainty who wrote the paper and who stole it. And, of course, we cannot know if there was collusion between you and the other student in the matter.
- **Penalties for Cheating**: Should a faculty member discover a student cheating on an exam or quiz or other class project, the student should receive a "zero" for the assignment and not be allowed to make the assignment up. The incident should be reported to the chair of the department and to the Honor Council. If the cheating is extensive, however, or if the assignment constitutes a major grade for the course (e.g., a final exam), or if the student has cheated in the past, the student should receive an "F" in the course, and the matter should be referred to the Honor Council. Additional penalties, including suspension or expulsion from the university may be imposed. Under no circumstances should a student who deserves an "F" in the course be allowed to withdraw from the course with a "W."
  - *Caution*: Chat groups that start off as "study groups" can easily devolve into "cheating groups." Be very careful not to join or remain any chat group if it begins to discuss specific information about exams or assignments that are meant to require individual work. If you are a member of such a group and it begins to cheat, you will be held responsible along with all the other members of the group. The TAMIU Honor Code requires that you report any such instances of cheating.
- **Student Right of Appeal**: Faculty will notify students immediately via the student's TAMIU e- mail account that they have submitted plagiarized work. Students have the right to appeal a faculty member's charge of academic dishonesty by notifying the TAMIU Honor Council of their intent to appeal as long as the notification of appeal comes within 10 business days of the faculty member's e-mail message to the student and/or the Office of Student Conduct and Community Engagement. The Student Handbook provides more details.

Use of Work in Two or More Courses

You may not submit work completed in one course for a grade in a second course unless you receive explicit permission to do so by the instructor of the second course. In general, you should get credit for a work product only once.

AI Policies

Your instructor will provide you with their personal policy on the use of AI in the classroom setting and associated coursework.

TAMIU E-Mail and SafeZone

Personal Announcements sent to students through TAMIU E-mail (tamiu.edu or dusty email) are the official means of communicating course and university business with students and faculty –not the U.S. Mail and no other e-mail addresses. Students and faculty must check their TAMIU e-mail accounts regularly, if not daily. Not having seen an important TAMIU e-mail or message from a faculty member, chair, or dean is not accepted as an excuse for failure to take important action.

Students, faculty, and staff are encouraged to download the SafeZone app, which is a free mobile app for all University faculty, staff, and students. SafeZone allows you to: report safety concerns (24/7), get connected with mental health professionals, activate location sharing with authorities, and anonymously report incidents. Go to SafeZone (https://www.tamiu.edu/adminis/police/safezone/index.shtml) for more information.

Copyright Restrictions

The Copyright Act of 1976 grants to copyright owners the exclusive right to reproduce their works and distribute copies of their work. Works that receive copyright protection include published works such as a textbook. Copying a textbook without permission from the owner of the copyright may constitute copyright infringement. Civil and criminal penalties may be assessed for copyright infringement. Civil penalties include damages up to $100,000; criminal penalties include a fine up to $250,000 and imprisonment. Copyright laws do not allow students and professors to make photocopies of copyrighted materials, but you may copy a limited portion of a work, such as article from a journal or a chapter from a book for your own personal academic use or, in the case of a professor, for personal, limited classroom use. In general, the extent of your copying should not suggest that the purpose or the effect of your copying is to avoid paying for the materials. And, of course, you may not sell these copies for a profit. Thus, students who copy textbooks to avoid buying them or professors who provide photocopies of textbooks to enable students to save money are violating the law.

Students with Disabilities

Texas A&M International University seeks to provide reasonable accommodations for all qualified persons with disabilities. This University will adhere to all applicable federal, state, and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal education opportunity. It is the student's responsibility to register with the Office of Disability Services for Students located in Student Center 124. This office will contact the faculty member to recommend specific, reasonable accommodations. Faculty are prohibited from making accommodations based solely on communications from students. They may make accommodations only when provided documentation by the Office of Disability Services for Students.

For accommodations or assistance with disabilities, contact the Disability Coordinator, Karla Pedraza, at karla.pedraza@tamiu.edu, call 956.326.2763, or visit Student Center 124.

Student Attendance and Leave of Absence (LOA) Policy

As part of our efforts to assist and encourage all students towards graduation, TAMIU provides
LOA's for students, including pregnant/parenting students, in accordance with the Attendance Rule (Section 3.07) and the Student LOA Rule (Section 3.08), which includes the "Leave of Absence Request" form. Both rules can be found in the TAMIU Student Handbook (URL: Student Handbook (https://www.tamiu.edu/handbook/index.shtml)).

Pregnant and Parenting Students

Under Title IX of the Education Amendments of 1972, harassment based on sex, including harassment because of pregnancy or related conditions, is prohibited. A pregnant/parenting student must be granted an absence for as long as the student's physician deems the absence medically necessary. It is a violation of Title IX to ask for documentation relative to the pregnant/parenting student's status beyond what would be required for other medical conditions. Students who experience or observe alleged or suspected discrimination due to their pregnant/parenting status, should report to the TAMIU Title IX Coordinator (Lorissa M. Cortez, 5201 University Boulevard, KLM 159B, Laredo, TX 78041, TitleIX@tamiu.edu, 956.326.2857) and/or the Office of Civil Rights (Dallas Office, U.S. Department of Education, 1999 Bryan Street, Suite 1620, Dallas, TX 75201-6810, 214.661.9600). You can also report it on TAMIU's anonymous electronic reporting site, *Report It*, at https://www.tamiu.edu/reportit (https://www.tamiu.edu/reportit/index.shtml).

TAMIU advises a pregnant/parenting student to notify their professor once the student is aware that accommodations for such will be necessary. It is recommended that the student and professor develop a reasonable plan for the student's completion of missed coursework or assignments. The Office of Compliance (Lorissa M. Cortez, lorissam.cortez@tamiu.edu) can assist the student and professor in working out the reasonable accommodation. For other questions or concerns regarding Title IX compliance related to pregnant/parenting students, contact the Title IX Coordinator. In the event that a student needs a leave of absence for a substantial period of time, TAMIU urges the student to consider a Leave of Absence (LOA) as outlined in the TAMIU *Student Handbook*.#As part of our efforts to assist and encourage all students towards graduation, TAMIU provides LOAs for students, including pregnant/parenting students, in accordance with the Attendance Rule and the Student LOA Rule.#Both rules can be found in the TAMIU *Student Handbook*.

For parenting-related rights, accommodations, and resources, contact the Parenting Liaison, Mayra Hernandez, at mghernandez@tamiu.edu, call 956.326.2265, or visit Student Center 226.

For pregnancy-related rights, accommodations, and resources, contact the TIX Coordinator, Lorissa Cortez, at lorissaM.cortez@tamiu.edu, call 956.326.2857, or visit Killam Library 159.

Anti-Discrimination/Title IX

TAMIU does not discriminate or permit harassment against any individual on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, educational programs, or employment. If you would like to file a complaint relative to Title IX or any civil rights violation, please contact the TAMIU Director of Equal Opportunity and Diversity/Title IX Coordinator, Lorissa M. Cortez, 5201 University Boulevard, Killam Library 159B, Laredo, TX 78041, TitleIX@tamiu.edu, 956.326.2857, via the anonymous electronic reporting website, ReportIt (https://

www.tamiu.edu/reportit) and/or the Office of Civil Rights (Dallas Office), U.S. Department of Education, 1999 Bryan Street, Suite 1620, Dallas, TX 75201-6810, 214.661.9600.

Incompletes

Students who are unable to complete a course should withdraw from the course before the final date for withdrawal and receive a "W." To qualify for an "incomplete" and thus have the opportunity to complete the course at a later date, a student must meet the following criteria:

1. The student must have completed 90% of the course work assigned before the final date for withdrawing from a course with a "W", and the student must be passing the course;
2. The student cannot complete the course because an accident, an illness, or a traumatic personal or family event occurred after the final date for withdrawal from a course;
3. The student must sign an "Incomplete Grade Contract" and secure signatures of approval from the professor and the college dean.
4. The student must agree to complete the missing course work before the end of the next long semester; failure to meet this deadline will cause the "I" to automatically be converted to an "F"; extensions to this deadline may be granted by the dean of the college. This is the general policy regarding the circumstances under which an "incomplete" may be granted, but under exceptional circumstances, a student may receive an incomplete who does not meet all of the criteria above if the faculty member, department chair, and dean recommend it.

WIN Contracts

The Department of Biology and Chemistry does not permit WIN contracts. For other departments within the college, WIN Contracts are offered only under exceptional circumstances and are limited to graduating seniors. Only courses offered by full-time TAMIU faculty or TAMIU instructors are eligible to be contracted for the WIN requirement. However, a WIN contract for a course taught by an adjunct may be approved, with special permission from the department chair and dean. Students must seek approval before beginning any work for the WIN Contract. No student will contract more than one course per semester. Summer WIN Contracts must continue through both summer sessions.

Student Responsibility for Dropping a Course

It is the responsibility of the student to drop the course before the final date for withdrawal from a course. Faculty members, in fact, may not drop a student from a course without getting the approval of their department chair and dean.

Independent Study Course

Independent Study (IS) courses are offered only under exceptional circumstances. Required courses intended to build academic skills may not be taken as IS (e.g., clinical supervision and internships). No student will take more than one IS course per semester. Moreover, IS courses are limited to seniors and graduate students. Summer IS course must continue through both summer sessions.

Grade Changes & Appeals

Faculty are authorized to change final grades only when they have committed a computational error or an error in recording a grade, and they must receive the approval of their department chairs and the dean to change the grade. As part of that approval, they must attach a detailed explanation of the reason for the mistake. Only in rare cases would another reason be entertained as legitimate for a grade change. A student who is unhappy with his or her grade on an assignment must discuss the situation with the faculty member teaching the course. If students believe that they have been graded unfairly, they have the right to appeal the grade using a grade appeal process in the Student Handbook and in the Faculty Handbook.

Final Examination

All courses in all colleges must include a comprehensive exam or performance and be given on the date and time specified by the Academic Calendar and the Final Exam schedule published by the Registrar's Office. In the College of Arts & Sciences all final exams must contain a written component. The written component should comprise at least 20% of the final exam grade. Exceptions to this policy must receive the approval of the department chair and the dean at the beginning of the semester.

Mental Health and Well-Being

The university aims to provide students with essential knowledge and tools to understand and support mental health. As part of our commitment to your well-being, we offer access to Telus Health, a service available 24/7/365 via chat, phone, or webinar. Scan the QR code to download the app and explore the resources available to you for guidance and support whenever you need it. The Telus app is available to download directly from TELUS (tamiu.edu) (https://www.tamiu.edu/counseling/telus/) or from the Apple App Store and Google Play.