Modern Algebra MATH 4306  
Department of Mathematics and Statistics  
Spring 2018

A. COURSE INFORMATION

Course number/section: MATH-4306.001  
Class meeting time: TR 9:30-10:45am  
Class location: TBA  
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Jordan Alexander  
Office location: CI 213a  
Office hours: MWF 9:00-10:00am, TR 11:00am-12:00pm  
Telephone: (361) 825-3613  
e-mail: jordan.alexander@tamucc.edu  
Appointments: email me to make an appointment to meet outside office hours

C. COURSE DESCRIPTION

Catalog Course Description
3 sem. hrs. (3:0) Fundamentals of set operations, maps and relations, groups, rings and field theory. Topics include permutation groups, cosets, homomorphisms and isomorphisms, direct product of groups and rings, integral domains, field of quotients, fundamental properties of integers, the ring of integers modulo n, and rings of polynomials. Applications.

Extended Course Description  
Permutation groups, cyclic groups, isomorphisms, Lagrange’s Theorem, normal subgroups, quotient groups, Fundamental Theorem of Finitely Generated Abelian Groups, rings, fields, exploration.

D. PREREQUISITES FOR THE COURSE

Prerequisites  
MATH 3311 and MATH 3313

Corequisites  
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)  
Joseph A. Gallian’s *Contemporary Abstract Algebra*. (8th Edition recommended)
Optional Textbook(s) or Other References

Supplies
None

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the courses student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Discuss group structure and properties in detail.
2. Give definitions and basic examples of rings and fields.
3. Explore new questions about groups, rings and fields.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Most class meetings will be centered around lecture. However, students will be asked to share insights and to contribute to the flow of the class.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Student learning outcomes will be measured in the 3 following ways:

1. **Four homework assignments** will be collected throughout the semester. Each assignment covers multiple chapters. For chapters 1 – 7, work through all the odd-numbered problems. For chapters 8 – 13, work through the first 5 odd-numbered problems. Hints are in the back of the book. Work on each problem 5 minutes before looking at the hint in the back of the book. If you can’t figure out the full solution, describe what you understand and what you don’t understand.

2. Students will turn in **one exploration assignment**. For the assignment, choose a topic from modern algebra that sounds interesting to you, and explore it. Feel free to search the internet or any other resource to find interesting applications of modern algebra. **Record your exploration by communicating an even mix (roughly) of**
   (a) interesting facts you have found from outside sources (quote the sources),
   (b) your own thoughts (your understanding, desires, frustrations, conclusions), and
(c) examples you have tried to work through in order to build up some intuition about whatever it is you’re trying to understand.

Please write legibly. I don’t care whether or not you get it all figured out before you turn in the assignment. I just want to see you genuinely explore and play with math. I expect you to spend 8-12 hours on the assignment.

3. Three midterm exams will be given during the semester, and a final exam will be administered on the regular final exam date scheduled by the university. Students will not be allowed to use calculators, phones, notes, or any other type of help during the exams. Studying for the exams will help solidify your understanding of key concepts developed in the class.

The following letter grades will be assigned to the associated range of final grades: 90.0 – 100 A; 80.0 – 89.99 B; 70.0 – 79.99 C; 60.0 – 69.99 D; below 60 F.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Homework (4)</td>
<td>20% (5% each)</td>
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<tr>
<td>Exploration (1)</td>
<td>20% (20% each)</td>
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<tr>
<td>Exams (4)</td>
<td>60% (15% each)</td>
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I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Dates</th>
<th>Week</th>
<th>Topic</th>
<th>Chapters</th>
<th>Due Tues.</th>
<th>Due Thurs.</th>
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<tbody>
<tr>
<td>1/17 – 1/19</td>
<td>1</td>
<td>Intro</td>
<td>0</td>
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<tr>
<td>1/22 – 1/26</td>
<td>2</td>
<td>Preliminaries</td>
<td>0</td>
<td></td>
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<tr>
<td>1/29 – 2/2</td>
<td>3</td>
<td>Groups</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>2/5 – 2/9</td>
<td>4</td>
<td>Groups</td>
<td>2</td>
<td></td>
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<tr>
<td>2/12 – 2/16</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>Exam 1, HW 1</td>
</tr>
<tr>
<td>2/19 – 2/23</td>
<td>6</td>
<td>Subgroups</td>
<td>3</td>
<td></td>
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<tr>
<td>2/26 – 3/2</td>
<td>7</td>
<td>Cyclic Groups</td>
<td>4</td>
<td></td>
<td>Exam 2, HW 2</td>
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<tr>
<td>3/5 – 3/9</td>
<td>8</td>
<td></td>
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<tr>
<td>3/12 – 3/16</td>
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<td>Spring Break!</td>
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<tr>
<td>3/19 – 3/23</td>
<td>9</td>
<td>Permutation Groups</td>
<td>5</td>
<td></td>
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<tr>
<td>3/26 – 3/30</td>
<td>10</td>
<td>Isomorphisms</td>
<td>6</td>
<td></td>
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<tr>
<td>4/2 – 4/6</td>
<td>11</td>
<td>Cosets &amp; Lagrange’s Thm</td>
<td>7</td>
<td></td>
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<tr>
<td>4/9 – 4/13</td>
<td>12</td>
<td></td>
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<td></td>
<td>Exam 3, HW 3</td>
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<tr>
<td>4/16 – 4/20</td>
<td>13</td>
<td>Normal Subgroups</td>
<td>8, 9</td>
<td></td>
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<tr>
<td>4/23 – 4/27</td>
<td>14</td>
<td>Homomorphisms</td>
<td>10, 11</td>
<td>Exploration</td>
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<tr>
<td>5/1</td>
<td>15</td>
<td>Rings &amp; Fields</td>
<td>12, 13</td>
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<td>5/10</td>
<td></td>
<td>Final Exam, HW 4</td>
<td>Thurs. 5/10 @ 8:00-10:30 am</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness
Punctual class attendance is highly recommended.

Late Work and Make-up Exams
If a student misses an exam, the student’s grade on the final exam will serve as a replacement for the missed exam. Exceptions can be made to this rule if the student notifies me far in advance.

Late homework and exploration assignments will receive a 5% penalty for each regular weekday that they are late (up to the last day of class).

Long term illness and official university business are the only exceptions to these rules.

Extra Credit
There is no extra credit given in this course. Just study diligently throughout the semester.

Cell Phone Use
Please leave the room to use your phone.

Laptop Use
Please do not open laptops during class. This can distract others from learning, and part of my job is to provide a class atmosphere that aids student learning.

Food in Class
Please do not eat during class. This can distract others from learning, and part of my job is to provide a class atmosphere that aids student learning.

Missed Exam
See “Late Work and Make-up Exams” above.

Participation
Strong, consistent class participation is expected from all students.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as ones own work.) In this
class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructors ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar at

  [http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)

  for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process,
see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These
documents are accessible through the University Rules website at

http://www.tamucc.edu/provost/university_rules/index.html

and the College of Science and Engineering Grade Appeals webpage at

http://sci.tamucc.edu/students/GradeAppeal.html

For assistance and/or guidance in the grade appeal process, students may contact
the chair or director of the appropriate department or school, the Office of the
College of Science and Engineering Dean, or the Office of the Provost.

• Disability Services
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute
that provides comprehensive civil rights protection for persons with disabilities.
Among other things, this legislation requires that all students with disabilities be
guaranteed a learning environment that provides for reasonable accommodation of
their disabilities. If you believe you have a disability requiring an accommodation,
please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access
issues in the classroom or on campus, please contact the Disability Services office
for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

• Statement of Academic Continuity
In the event of an unforeseen adverse event, such as a major hurricane and classes
could not be held on the campus of Texas A&M University–Corpus Christi; this
course would continue through the use of Blackboard and/or email. In addition,
the syllabus and class activities may be modified to allow continuation of the course.
Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be oper-
ational within two days of the closing of the physical campus. However, students
need to make certain that the course instructor has a primary and a secondary
means of contacting each student.

L. OTHER INFORMATION

• Academic Advising
The College of Science & Engineering requires that students meet with an Academic
Advisor as soon as they are ready to declare a major. The Academic Advisor will
set up a degree plan, which must be signed by the student, a faculty mentor, and the
department chair. Meetings are by appointment only; advisors do not take walk-
ins. Please call or stop by the Advising Center to check availability and schedule
an appointment. The College's Academic Advising Center is located in Center for
Instruction 350 or can be reached at (361) 825-3928.
GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.