

MAT 5420: Modern Algebra

Professor

Fall 2021

Office Hours:

Rationale

Modern Algebra entails an examination of the common structures which unite such mathematically diverse objects as integers, rational numbers, real numbers, complex numbers, matrices, polynomials, integers with modular arithmetic, symmetries on a geometric figure and continuous functions. The results and concepts of modern algebra play important roles in higher mathematics, physics, chemistry, and computer science.

Learning Objectives

At the conclusion of the course, the successful student should be able to define, explain, discuss, and apply the concepts of groups, rings, integral domains, and fields and related abstract mathematical concepts. Topics include:

1. binary operations on numbers, functions and matrices
2. properties of relations including equivalence relations and equivalence classes
3. proof by induction
4. the division algorithm and the Euclidean algorithm
5. the fundamental theorem of arithmetic
6. congruence modulo n
7. binary coding and cryptography
8. groups, subgroups and Cayley tables
9. cyclic groups and subgroups and their generators
10. group homomorphisms and isomorphisms
11. permutation groups and Cayley's theorem
12. cosets and Lagrange's theorem
13. normal subgroups and the Fundamental Theorem of group homomorphisms
14. rings and subrings
15. integral domains and fields
16. ideals and the Fundamental Theorem of Ring Homomorphisms

-
17. polynomials over a commutative ring factorization Theorem
 18. irreducible polynomials and the Unique Factorization Theorem
 19. the Fundamental Theorem of Algebra

Required Materials

1. Elements of Modern Algebra eighth edition by Gilbert and Gilbert. ISBN-13: 978-1-285-46323-0. ISBN-10: 1-285-46323-4.
2. Notebook, paper or online note taking ability
3. Pencil for in-class tests and quizzes
4. Calculators are allowed but will seldom be needed.

Prerequisites/Corequisites

MAT 301

Assignments

Homework

Homework problems will be assigned regularly from the textbook. These problems will not be collected but will be used in writing tests and quizzes.

In Class Quizzes

Every Tuesday we will have an in-class quiz. The material on the quiz can come from anything we have covered up to the previous Thursday. No make-up quizzes will be allowed. Two or three quizzes will be dropped at the end of the semester so that students will not be punished for missing a quiz for health reasons. If you are joining class virtually, you may still take your quiz distantly. If you are taking a quiz virtually, YOU MUST EMAIL ME FOR APPROVAL BEFORE CLASS STARTS. In class quizzes will be 10 points each.

In Class Tests

Two in-class tests will be given over the course of the semester. All tests will be comprehensive as the material naturally builds. Tests are closed note, book, homework, etc. and your bags and phones must be placed out of reach of your seat. Make up exams will only be allowed if you have received prior permission from me. If unavoidable, dire circumstances arise, contact me IMMEDIATELY. The make up test may be different from the original exam. Each exam will be worth 100 points.

Presentations

You will each give two presentations throughout the semester, each worth 25 points. More information coming soon.

Graduate Presentations

To fulfill the graduate requirement, you will present a 30 minute lesson on either section 2.7, 2.8, 4.3, 4.7, 4.8, 5.3, 8.1, or 8.2. See attached rubric for details.

Final Exam

A comprehensive final exam worth 130 points will be given Tuesday, December 14th from 8:00 am until 11:00 am. If you have three finals that day and need to move one, contact me ASAP.

There will be a total of 500 points possible this semester.

A 90-100 (450-500 points)

D 60-69 (300-349 points)

B 80-89 (400-449 points)

F 0-59 (299 points or less)

C 70-79 (350-399 points)

Drop date: October 29. This is the last day to drop the course with a W.

Help Outside of Class

- Come to office hours. If my designated hours do not work with your schedule, email me or come see me after class to work out an alternate time. I want you to do well and to help you to the best of my ability. I am also available for Zoom office hours.
- Math Tutoring: More information coming soon.
- Private Tutors: ask Dr. Poe or Mrs. Tatum for recommendations.
- Counseling Center: This is a great resource if you ever need to talk to someone. For more information call 601-925-7790, email scds@mc.edu or go to <https://www.mc.edu/offices/counseling/>.

Zoom Protocol

1. Your camera should be on and you should be visible at all times.
2. If you are taking a test or quiz over zoom, the camera must be positioned in such a way that your desk space is visible. Your microphone must also be on.
3. Participation is still expected (ie. during in-class group work, answering questions, etc)
4. You must notify me the day before if you intend to join class via zoom with your reasoning. The zoom option was made available for when students have to quarantine for the safety of the rest of the class. I reserve the right to remove students from the zoom call should this privilege be abused.

Campus Policies

ACADEMIC INTEGRITY

Mississippi College students are expected to be scrupulously honest. Dishonesty, such as cheating or plagiarism, or furnishing false information, including forgery, alteration or misuse of University documents, records or identification, will be regarded as a serious offense subject to severe penalty, including, but not limited to, loss of credit and possible dismissal. See the Mississippi College Student Handbook or University Policy 2.19 for specific information regarding penalties associated with dishonest behavior at Mississippi College. Copies of the Mississippi College Student Handbook are available in the Office of the Vice President for Enrollment Management and Student Affairs, Nelson 313. Copies of University policies are available on the Mississippi College web site.

ATTENDANCE

University policy states: A student receives a grade of F in a course immediately upon accumulating the following number of absences, whether excused or unexcused: 8 in semester classes meeting 2 times per week.

If attending virtually becomes necessary, you must have your webcam on and be visible on camera for the duration of the class to be counted as present.

Early Alert System

Mississippi College has adopted the practice of finding students early in the semester who may be exhibiting behaviors that could ultimately have a negative impact on their academic progress. These behaviors are often called “red flag” behaviors and include, but are not limited to, excessive absences, poor test grades, and lack of class participation or evidence of non-engagement. Identifying these behaviors early gives the instructor the opportunity to raise the “red flag” on behalf of a particular student so that the student can take the appropriate action to redirect his/her progress. The system alerts the student, the student’s advisor, and the Office of Student Success.

These messages are intended to help a student recognize an area of concern and to encourage him/her to make some choices to improve the situation. When a student receives an Early Alert message, the student should quickly make an appointment to talk with his/her professor about the situation. Also, students can make full use of the Office of Student Success to set academic goals and connect to campus resources.

Students with Disabilities

If you have a documented disability please contact the Office of Counseling and Disability Services. Students are responsible to obtain appropriate documentation and information regarding accommodations from the Office of Student Counseling and Disability Services (SCDS). Student Counseling and Disability Services are located in 400 Alumni Hall. You can contact their office as follows: scds@mc.edu or at 601-925-7790. The Student Counseling and Disability Services website can be accessed by going to <https://www.mc.edu/offices/counseling/>. Further

instructions and explanations regarding disability services can be accessed through the Disability Handbook (<https://www.mc.edu/offices/counseling/application/files/5115/7868/8987/DSHandbook2020.pdf>).

Title IX

Mississippi College does not unlawfully discriminate on the basis of sex in any of its educational or employment programs and activities, and it does not tolerate discrimination or harassment on the basis of sex. This policy prohibits sexual harassment, sexual assault, sexual exploitation, stalking intimate partner violence, and retaliation (collectively referred to as prohibited conduct). For more information on how to report an allegation of prohibited conduct, contact the Title IX Coordinator, Dr. Kristena Gaylor, by phone (601) 925-3415 or email at kgaylor@mc.edu. Self Hall, Suite 200-B. You may also use this link to review additional resources about the university's Title IX policy and procedures: <https://www.mc.edu/title-ix/>.

Covid-19 Fall 2021 Addenda: Right to Modify the Course

Should covid conditions change, Mississippi College reserves the right to modify this class at any point during the term. Potential changes include the implementation of safety protocols, the mode of course delivery, or any other aspects of the course which may become reasonably necessary.

BE SURE YOUR MOODLE NOTIFICATIONS ARE TURNED ON AND ARE CHECKING YOUR EMAIL REGULARLY!

If you have to quarantine...

Contact me as soon as possible.