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Fall 9-1-2018

# M 431.01: Abstract Algebra I

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## Syllabus for M 431: Abstract Algebra I (Fall 2018)

The course M 431 is an introduction to abstract algebra. We'll begin with some topics from number theory, including modular arithmetic (e.g., the clock numbers). The main part of the course will be devoted to studying “rings” and “groups” – the two most important concepts in modern abstract algebra. Roughly speaking, a ring is a set with two operations which “behave like” addition and multiplication of integers (or “like” addition and multiplication of  $2 \times 2$  square matrices). And a group is a set together with an operation which “behaves like” multiplication does for real numbers. It will take us some work to make these definitions precise, to become familiar with them, and to understand their importance and usefulness.

### Instructor Information

Instructor: Nikolaus Vonessen

Office: Math 207

Email: [nikolaus.vonessen@umontana.edu](mailto:nikolaus.vonessen@umontana.edu)

Phone: (406) 243-6222

Office hours: Posted on my webpage, which is linked from the math department website

Good times to see me are after class and during office hours.

### Required Textbook

*Abstract Algebra, An Introduction*, 2<sup>nd</sup> edition, by Thomas W. Hungerford, Brooks/Cole, 1997, ISBN-10: 0-03-010559-5, ISBN-13: 978-0030105593. (Please note that the first or third edition will not work.)

After a review of some of the material from Chapter 1, we will cover most of the material from the following chapters (in this order): 2, 12, 3, 4 (through 4.4, plus a bit from 4.5 and 4.6), 7 (through 7.5), and 15.

### Learning Outcomes

Upon completion of this course, a student will be able to:

1. Demonstrate understanding of the basics of group and ring theory;
2. Explain the important definitions and use them correctly;
3. Demonstrate proficiency at simple verification proofs;
4. Demonstrate improved proficiency in constructing proofs (focusing on correctness and clarity);
5. Demonstrate improved use of English in written assignments.

### Course Grade

- 10% proof writing homework (one proof graded for writing most weeks, resubmission is possible)
- 20% other homework (1-3 problems graded each week)
- 10% weekly quizzes
- 40% two tests
- 20% comprehensive final exam

### Grading Scale

Cutoff Percentage:	93%	90%	87%	83%	80%	75%	70%	65%	62%	58%	55%
Grade:	A	A-	B+	B	B-	C+	C	C-	D+	D	D-

## Tests

Usually, no make-up exams will be given. If you miss a test for a legitimate reason, and if you inform me about it in a timely manner, we will make alternate arrangements (e.g., substituting the grade of the final exam for the missed test).

## Quizzes

Most weeks, there will be a short quiz on definitions and statements of results (usually on Tuesday). I will drop the lowest quiz score.

## Homework

Working on problems seems to be the most important part of learning mathematics – so please take the homework seriously. **Homework has to be turned in by 4pm on the due date.** If you cannot hand it in on time for a “really good” reason, contact me, and I may be able to give you an extension. (If I receive too many extension requests, I will have to change my policy and only grant extensions in cases of documented illness or other exceptional circumstances beyond your control.) Note that the homework assignments will only be partially graded, and that I will drop the lowest homework score.

## Collaboration on Homework Problems

I encourage collaboration (i.e., **working together** to solve problems, not simply copying the work of others). I require, however, the following:

1. You always have to write up the solutions in your own words (again, no copying!).
2. You must indicate with whom you worked to solve the problem.
3. It is not permitted to use the Web (Internet) to aid in solving homework problems.

On the other hand, it is also very important to learn to solve problems on one’s own. On each homework set, there will be some “**do-on-your-own**” problems marked by a **star (\*)**. As the name implies, you have to solve these problems completely on your own – you can consult books but no other materials, and nobody else (with one exception: you can ask me for hints in class or during my office hours).

## Graduate Increment

Graduate students taking this course for graduate credit are expected to perform at a higher level than undergraduates. For graduate students, the above grade scale applies also to “other homework” and quizzes. For undergraduate students, I consider obtaining a score of 80% or greater on a homework set quite good. To reflect this, I will (at the end of the semester) multiply the “other homework” and quiz scores of undergraduate students by 1.1, resulting in a 10% increase (but with a maximum score of 100%).

## Attendance

Attendance is not mandatory but strongly recommended. Only the occasional exceptional student can learn advanced mathematics while skipping many lectures.

## You are expected to study quite a bit outside of class:

Reviewing the material, doing the homework, preparing for the next class, and preparing for the tests and the final exam. If you want to do well in this class, plan to spend **at least eight hours per week** on this.

## Some Important Dates

Date	Event
Monday, Sep. 3	Labor Day (no classes)
Monday, Sep. 17	Last day to drop without a W on the transcript; also last day to change the grading option to audit
<b>Wednesday, Oct. 3 (tentative)</b>	<b>Test 1</b>
Monday, Oct. 29	Last day to drop without a petition (and without a WP or WF on the transcript)
Tuesday, Nov. 6	Election Day (no classes)
Monday, Nov. 12	Veterans Day (no classes)
Wednesday–Friday, Nov. 21-23	Thanksgiving Break (no classes)
<b>Tuesday, Nov. 27 (tentative)</b>	<b>Test 2</b>
Friday, Dec. 7	Last day of classes, last day for petitions to drop, and last day to change the grading option from traditional to CR/NCR grading
<b>Wednesday, Dec. 12, 1:10-3:10 pm</b>	<b>Final Exam</b> (If I can reserve the classroom for longer, and if nobody objects by September 14, I will collect the exams only at 4:10 pm.)

## Disability Modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students](#). If you have a disability that adversely affects your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 (or call 406-243-2243). I will work with you and Disability Services to provide an appropriate modification.

## Academic Honesty

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

## Student Conduct Code

All students need to be familiar with the [Student Conduct Code](#). You can find it in the “A to Z” index on the UM home page.