Fall 9-1-2020

M 431.R01: Abstract Algebra I

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Syllabus for M 431: Abstract Algebra I (Fall 2020)

The course M 431 is an introduction to abstract algebra. After some preliminary topics, 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 2×2 square matrices). And a group is a set together with one 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
Email: nikolaus.vonessen@mso.umt.edu
Phone: (406) 243-6222 (for leaving voicemail messages; email is strongly preferred)
Office hours: (Find me on the Math Department's People page.)

Course Catalog Description
4 Credits. Offered autumn. Prereq., M 221 and M 307 or consent of instr. An introduction to modern ideas of algebra through the study of groups, rings, and fields. Level: Undergraduate-Graduate

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.

Required Textbook
We'll use the open source textbook *Abstract Algebra: Theory and Applications* by Thomas W. Judson. We will use the 2020 annual edition (dated July 30, 2020). The core of the course will consist of most of the material from Chapters 1-7, 9, 16, and 17. We will cover additional topics as time permits.

Course Grade
- 15% proof writing homework (one proof specifically graded for writing most weeks, resubmission is possible)
- 40% other homework (most of the problems also involve proving facts)
    - About 2-4 problems graded each week for all students. This category may also include some announced quizzes (each counting like a homework set).
    - Graduate students taking this course for graduate credit have additional weekly homework, which accounts for half of the 40%.
- 30% two tests
- 15% 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).

Policies for the Tests and the Final

This is a separate document, available on Moodle under "Course Information". It describes the policies for our remote exams; they may have to be updated during the semester.

Homework

Working on problems seems to be the most important part of learning mathematics – so please take the homework seriously. **Homework has to be uploaded on Moodle by 11 pm on the due date.** Note that the homework assignments will only be partially graded, and that I will drop the lowest homework score.

- **Extensions:** If you cannot submit a homework set on time for a good reason, contact me before it is due, and I will usually be able to give you an extension. (If I should receive too many extension requests, I might have to change my policy and only grant extensions in cases of documented illness or other exceptional circumstances beyond your control.)
- **To the extent it is reasonably possible, please use LaTeX to write up the solutions of homework problems.** This is a request, not a requirement. PDF files created with LaTeX are a great way to communicate mathematics in writing, and make grading much easier. But feel free to submit handwritten solutions in cases where LaTeX coding becomes cumbersome (e.g., solutions involving quite a few matrix sums or products). If you have never used LaTeX, look on Moodle (under Course Information) for some simple instructions on how to get started.
- **If possible, please upload just one PDF file per homework set.** Again, this is a request, not a requirement. I prefer PDF files (they are easy to annotate while grading), and I prefer just one file over several image files (that makes it easier for me to keep track of your work while grading).

Problems will be graded based on two considerations:

- Logical correctness.
- Ease of readability. (This is of utmost importance in our class. I think of this class as one where you refine your proof reasoning and writing skills.) Technically correct but hard to read/understand/follow proofs will not receive full points. Caution: this is subjective.

Collaboration on Homework Problems

I encourage collaboration (i.e., **working together** to solve problems, not simply copying the work of others). Come up with the ideas behind the solutions as a group, then write up your own solution. Avoid reading other solutions before writing up your own. 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 several **"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, **both 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. These graduate students must do additional homework problems, which count for 20% of the grade for the course.

Attendance

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

Additional Reading Assignments

To make up for the slightly shorter semester, a couple of the easier topics will not be covered during class meetings. Instead, I'll ask you to read up on them in the textbook. Several of the weekly homework sets will contain problems regarding these additional reading assignments.

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. 7	Labor Day (no classes)
Wednesday, Sep. 9 (5 pm)	Last day to drop without a W on the transcript; also last day to change the grading option to audit
Wednesday, Sep. 23 (tentative)	**Test 1**
Wednesday, Oct. 21 (5 pm)	Last day to drop without a petition (and without a WP or WF on the transcript)
Wednesday, Oct. 28 (tentative)	**Test 2**
Tuesday, Nov. 3	Election Day (no classes)
Wednesday, Nov. 11	Veterans Day (no classes)
Wednesday, Nov. 18 (5 pm)	Last day of classes, last day for petitions to drop, and last day to change the grading option from traditional to CR/NCR grading
Thursday, Nov. 19, 1:10-3:10 pm	**Final Exam** (If nobody objects by September 9, I will collect the exams only at 4:00 pm.)

Recording of Class Meetings

Because our class is a remote class, class meetings via Zoom will be recorded. I will let you know if this policy changes.

Classroom and Course-related Behavior

University policy requires that all of us in the classroom treat each other with respect, and refrain from behavior that will disrupt the educational process. Please refrain from using any electronics during class that are not directly related to what we are doing. If you would prefer to be called by a **different name, or gender pronoun**, than listed on the course roster, please let me know.

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.

Statement on Digital Access

Digital devices (like laptops and cell phones) are becoming increasingly important to success in college. In this course, you may need digital devices to access readings, complete and submit written assignments, complete online quizzes, verify your attendance, take in-class polls, and more. I recognize that some students are unable to afford the cost of purchasing digital devices and that other students rely on older, more problem-prone devices that frequently break down or become unusable. I also recognize that those technology problems can be a significant source of stress for students. Given those challenges, I encourage students to contact me if they experience a technology-related problem that interferes with their work in this course. This will enable me to assist students in accessing support.

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. In particular, discrimination and harassment are not tolerated at the University of Montana. If you feel that you have been subjected to discriminatory or harassing behavior, please contact the Office of Equal Opportunity and Title IX at 243-5710 or read UM's Policy on Discrimination, Harassment, Sexual Misconduct, Stalking, and Retaliation for help in addressing the situation. You can also report the discrimination or harassment to me or to another faculty member or advisor you trust.