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# M 307.01: Introduction to Abstract Mathematics

Eric B. Chesebro

*University of Montana, Missoula*

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# INSTRUCTOR INFORMATION:

Instructor: Eric Chesebro

Office: 308 Mathematical Sciences

Email: [eric.chesebro@mso.umt.edu](mailto:eric.chesebro@mso.umt.edu)

Phone: x2687

Office hours: TBA

## COURSE OVERVIEW

This is a course in writing and creative problem solving. Our goal is to develop our skills to write and communicate effective proofs of mathematical facts. You will build on your skills for reading and writing mathematics and work to familiarize yourself with the abstract reasoning necessary in upper division mathematics courses.

The skills you will develop in this course are highly valued in the world outside math. No matter the profession you ultimately choose, one of the most important ways you will be distinguished from your peers will be your ability to communicate effectively and to think clearly, critically, and abstractly.

We will learn according to an educational philosophy called 'inquiry-based learning' (IBL) in order to encourage you to take a very active personal role in your learning. The IBL philosophy suggests that students should be responsible, as much as possible, for guiding the acquisition of knowledge and validating the ideas presented.

## TEXTBOOK

We will not use a formal text in this class, instead we will follow a list of problems and tasks adapted for IBL and based on a set of notes written for this purpose by Prof. Dana Ernst at NAU. You will be expected to read and digest the material from these notes. You should be looking for clarification whenever necessary by asking questions.

Read your math slowly and with a piece of paper. Use this paper, not only to take notes, but also to figure stuff out, look at examples, and ask your own questions.

## RULES

- Participation is a critical part of this course and your attendance is required.
- Intra-class collaboration is encouraged. This includes homework and take-home exams. (Every student is expected to turn in their own work.)
- You are allowed to turn in 2 late (weekly) homeworks with no questions asked. Other than this, late

homework will not be accepted. Without prior approval, homework turned in after class is considered late.

- No outside resources are allowed. This includes the internet, other texts or notes, and people who are not in this room.
- You are expected to be polite to me and your classmates. This includes coming to class on time, acting interested and engaged, and not using electronic devices and computers for social reasons during class.

## **NOTABLE CHALLENGES**

- You will be routinely asked to think deeply about new ideas.
- You will constantly be asked to work on problems which you have not been shown how to solve.
- You will be challenged directly about the details in your reasoning.
- You will be criticized in your writing.
- You may experience frustration and failure before success. Becoming comfortable with this process is one of the most empowering skills you can develop to become an independent lifelong learner.
- Solving new problems and mastering new concepts is both difficult and time consuming. It may take time, experimentation, and deep thinking before you develop a plan for how to even begin a task.

## **ASSESSMENT**

### **Daily homework**

In each class period, you will be assigned some tasks which need to be completed before the next class meeting. These assignments should be carefully, clearly, and cleanly written in order to receive credit. You should work in drafts and hand in a copy of your final draft. You will also need to keep a copy of your final draft to refer to during class.

You will be graded on the work you have completed before the class meeting begins. I will use a quick 'check system' to grade these assignments.

### **Presentations**

Presentations will occur each class period and might be assigned to groups or individuals. I will select presenters based on (computer) random choices, quantity of presentations for each student, existence of volunteers.

Presentations are usually based on daily homework tasks. The main purpose of the presentations is to make the ideas of your solution clear to your peers.

- Completely correct and clear proof/solution. 4 points.

- Minor technical errors or lacking minor details. 3 points.
- Partial explanation/proof is given but significant gap remains. 2 points.
- Minimal progress. 1 point.
- No preparation is evident. 0 points.

You can and should annotate your daily homework during presentations in order to prepare for weekly homework.

## Weekly homework

Choose 2 problems from the a list of Daily Homework problems to write up beautifully. Use the LaTeX template posted on Moodle.

- Correct and well-written. 4 points.
- Good work but some mathematical errors or writing errors that need addressing. 3 points.
- Some good intuition, but this is at least one serious flaw. 2 points.
- I don't understand this, but I see that you did work on it. 1 point.
- No work is evident. 0 points.

## Exams

We will have two midterm exams and a cumulative final exam. Exams will incorporate both “in class” and “take home” tasks. Midterms are tentatively scheduled for TBA and TBA. The final exam will be given according to the [Registrar's schedule](#). It is your responsibility to take these exams at the scheduled time.

## Grades

Exam problems will be graded according to the Weekly homework rubric listed above. Your exam score will be the average of your scores on the individual problems. Letter grades are assigned as follows:

- A: At least 3.6.
- B: Less than 3.6 but at least 3.
- C: Less than 3 but at least 2.3.
- D: Less than 2.3 but at least 1.7.
- F: Less than 1.7.

Each midterm will be worth 15% of your final grade and the final exam will be worth 25%. Homework will be worth 25% of your grade, divided evenly between weekly and daily homework. The remaining 20% of your grade will come from your presentation scores.

I will pass back graded work. It is your responsibility to log your scores if you want to track your grade. I will give you your presentation scores periodically and on request.

# **GUIDELINES AND POLICIES**

## **University dates and deadlines**

You should be aware of the important dates and deadlines posted by the [Registrar's Office](#).

## **Academic honesty**

I take academic honesty very seriously and I will act on any transgressions that I notice. Misconduct is subject to an academic penalty in this course and/or a disciplinary sanction by the university. We all know that a record of academic misconduct is a very bad thing to have documented in your academic history.

## **Student conduct code**

All students should be familiar with the [Student Conduct Code](#).

## **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 think you may have a disability adversely affecting 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.