

**Syllabus for M 307, Spring 2019**  
Introduction to Abstract Mathematics

Meeting Time: MWF 12:00 - 12:50  
Location: Math 306.

Professor: Jennifer Brooks  
Office: Math 107  
Office Phone: 243-2083  
e-mail: jennifer.brooks@mso.umt.edu  
Office Hours: MWF 1:00 – 1:50.

**Text:** *Exploring the Infinite: An Introduction to Proof and Analysis*, Jennifer Brooks, CRC Press, 2017.

*Course Description*

This course is designed to help you develop the tools needed in upper-division proof-based courses. This is the course in which you make the transition from a learner of mathematics to a creator of mathematics.

More specifically, the learning outcomes for this course are:

- (1) Recognize correct and incorrect mathematical reasoning.
- (2) Demonstrate an understanding of basic mathematical logic.
- (3) Use counter examples in rigorous arguments.
- (4) Write clear and concise proofs using the following methods: direct proof, contrapositive proof, proof by contradiction and proof by mathematical induction.
- (5) Write clear and concise proofs using basic set theory.
- (6) Write clear and concise proofs using precise definitions for functions and relations.
- (7) Write clear and concise proofs using injections, surjections, and bijections to compare cardinalities of sets.

*Assessment*

Homework: 25%  
Exams: 30%  
Portfolio: 25%  
Final: 20%

**Homework:** In upper-division courses, the homework assignments serve a different purpose than homework assignments given in 100- and 200-level courses; in the latter case, the main purpose of the homework is to give you practice with the basic ideas and techniques, and the grade is determined mostly through exams. In most upper-division courses, the “practicing” occurs on your own as you work through suggested exercises from the text and examples from the lecture. The homework assignments are where you are asked to bring together ideas and where you are to practice your mathematical writing skills. Homework is now the most important part of the assessment.

Homework is due each Wednesday. You are encouraged to work together and get all the help you need from me. However, you are expected to submit your own solutions.

**Exams.** There will be two midterm exams. They will be on and .

**Portfolio:** This is the part of the course in which you will really focus on learning to write clearly. Each week, you must select a new problem to add to your portfolio. Solutions are to be typed using latex. Each Monday, you must submit the first draft of your portfolio problem. I will comment on, but not grade, the solution at that time. The portfolio is submitted for grading at 3 points during the semester. *Portfolio problems are to be entirely your own work.* View them as a sort of take-home exam stretched over time, with a revision process.

**Final:** There will be a written final exam given .

### **Academic Misconduct**

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. All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VPSA/index.cfm/page/1321>.

### **Students with Disabilities**

Students with disabilities may request reasonable modifications by consulting with me. The University of Montana assures equal access to instruction through collaboration between students, instructors, and Disability Services for Students (DSS). For more information, consult <http://www.umt.edu/disability>.

### **Important Dates**

- Jan. 21 (Monday): MLK Day – no class.
- Feb. 18 (Monday): Presidents' Day – no class.
- Feb. 15 (Friday): Portfolio 1 due
- Feb. 22 (Friday): Exam 1.
- Mar. 22 (Friday): Portfolio 2 due.
- Mar. 25 – Mar 29: SPRING BREAK.
- Apr. 4 (Friday): Exam 2
- Apr. 26 (Friday): Last day of class.
- May 3 (Friday): Final Exam, 10:10 – 12:10. Portfolio 3 due.