

Math 201: Introduction to Proofs – Sections 1 & 3

Fall 2020 – 3 credits

MWF 8:50am – 9:40am (Section 1)

MWF 11:00am – 11:50am (Section 3)

LAGOMAR 2441

Instructor	Dr. Jason McCullough 452 Carver Hall Phone: 4-8150 Email: jmccullo@iastate.edu ← best way to contact me
Grader	Justin Stevenson jas1@iastate.edu
Online Office Hours	M 2:00-3:00 pm, Tu 10:00am-11:00am, Th 11:00am-12:00 pm or by appointment
Textbooks (both are free and online)	(BoP) R. Hammack, Book of Proof , 3rd. ed. (BA) J. Lebl, Basic Analysis: Introduction to Real Analysis .

Content

This class is designed to guide students through the transition from example-based calculus courses to advanced proof-based classes in mathematics. Emphasis is placed on learning how to recognize and handle valid mathematical statements, to create proofs of true statements, and to disprove false statements. A second objective is to learn how to communicate mathematics effectively, both in written and spoken form. We will emphasize proper notation, grammar, and logical reasoning.

Referring to the textbooks, we will cover most of Chapters 1-2, 4-12, and 14 in BoP and Chapters 1-3 in BA. These include the following topics:

- Set Theory (BoP Chapter 1)
- Logic (BoP Chapter 2)
- Methods of Proof (BoP Chapters 4-9)
- Induction (BoP Chapter 10)
- Relations and Functions (BoP Chapters 11,12)
- Cardinality (BoP Chapter 14)
- Ordered sets and fields (BA Chapter 1)
- Sequences and Series (BA Chapter 2)
- Limits and Continuity (BA Chapter 3)

Prerequisites: Math 166/166H – Calculus II

Assessment

There will be weekly homework assignments including one during prep week. While you are encouraged to work with the other students (in a physically distant manner), it is important that you **write up your own solutions independently**. Duplicate solutions will be penalized. It is very important that you do the homework conscientiously and consistently.

Homework will be assigned and collected on Canvas. You have 3 options for completing your homework assignments:

1. Type your solutions in Microsoft word. Save and upload a word DOC or PDF file.
2. Use a mobile phone scanning app (like these for [iOS](#) or [Android](#)) and upload a PDF of your **neatly written** solutions.
3. Type your solutions with LaTeX and upload a PDF. (This might be a good idea if you are contemplating graduate school in mathematics or you just enjoy pretty type setting but be warned: there is a steep learning curve.)

Your lowest 1 homework score will be dropped at the end of the semester. **HOWEVER**, to qualify you must attend at least one virtual office hour in the first 3 weeks of the course. If nothing else, this will give you a chance to introduce yourself (without the need for masks) and troubleshoot any connection issues early on.

We will have 2 take-home midterm exams and a take-home final exam. Just like the homework you will upload your completed assignment to Canvas.

The exams take place on the following days. (No class meeting on these days.)

Exam 1: Friday, Sept. 25

Exam 2: Monday, Nov. 9

Final Exam: Saturday, Nov. 21 (Section 1) OR Wednesday, Nov. 25 (Section 3)

Learning Outcomes

Upon completion of this course, students...

1. Will be able to construct proofs of basic mathematical statements including direct proofs, proofs by contradiction, and induction.
2. Will understand the basics of set theory and logic that build a foundation for the rest of mathematics.
3. Will learn how to effectively write mathematical arguments with proper notation and terminology.

Course Websites

Grades and homework will be available via Canvas. There is a tentative schedule below.

Grading scheme

Homework	60%
Exam 1	10%
Exam 2	10%
Final Exam	20%

Letter grades will be assigned based on your overall percentage and will be no stricter than a straight-scale (90+ = A, 80+ = B, etc.). If I deem it necessary, I may lower this scale based on homework and exam scores.

Mathematics Department Policy Statements (Academic Misconduct, Accessibility, Religious Accommodations, etc.)

See [here](#).

Tentative Schedule

Week (week of)	Monday	Wednesday	Friday
1 (August 17)	1.1-1.2 (BoP)	1.3-1.4	1.5-1.8
2 (August 24)	2.1,2.2	2.3-2.6	2.7,2.8
3 (August 31)	2.9,2.10	4.1-4.3	4.4,4.5
4 (September 7)	5.1,5.3	6.1	6.2
5 (September 14)	7.1,7.2	7.3,7.4	8.1-8.3
6 (September 21)	9.1-9.3	Review	Exam 1 (no class)
7 (September 28)	10.1,3.6	10.2	10.3
8 (October 5)	10.5	11.1,11.6	12.1
9 (October 12)	12.2,12.3	12.4,12.6	14.1,14.2
10 (October 19)	14.3	1.1,1.2 (BA)	1.3
11 (October 26)	2.1	2.2	2.3
12 (November 2)	2.4	2.5	Review
13 (November 9)	Exam 2 (no class)	3.1	3.2
14 (November 16)	3.3*	Review	Review

* if time allows

Covid-19 Health and Safety Requirements

Students are responsible for abiding by the university's COVID-19 health and safety expectations. All students attending this class in-person are required to:

- Properly wear a face covering and/or face shield, covering the nose and mouth, while in classrooms, laboratories, studios, offices, and other learning spaces. It is important to remember that a face covering and/or face shield is required to be worn whenever you are on campus, in the presence of others, and unable to maintain physical distance.
- Practice physical distancing to the extent possible;
- Assist in maintaining a clean and sanitary environment;
- Not attend class if you are sick or experiencing symptoms of COVID-19;
- Not attend class if you have been told to self-isolate or quarantine by a health official;
- Follow the faculty member's guidance with respect to these requirements. Failure to comply constitutes disruptive classroom conduct. Faculty and teaching assistants have the authority to deny a non-compliant student entry into a classroom, laboratory, studio, conference room, office, or other learning space.
- Not sit in seats that have been taped off to facilitate physical distancing. Sit in the same seat every class to facilitate contact tracing. (This may be altered if enrollment numbers change.)

Class Decorum and other items

- Please arrive on time and avoid congregating in the hallway.
- Cellphones should be silenced and stowed – not on your desk/lap.
- Not every class is in-person so please use this opportunity to ask questions!