

MTH 299 Fall 2020 Course Syllabus

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Meet your instructors and find out the right people to contact for possible issues

[WELCOME DOCUMENT / INSTRUCTOR INFO](#)

Communication with Instructors

Most instructors prefer to be contacted via email or via Piazza. Instructors will strive to respond to emails and Piazza posts within one business day but may not respond if

- they already addressed or are planning on addressing the question/issue in class to everyone, or
- if the answer is available on the syllabus/course website.

Questions that concern the course content or otherwise may be relevant to everyone should be posted on Piazza. Questions, which are more personal, for example concerning a student's grade, accommodations, etc. should be addressed to both recitation instructors of the student's specific section.

Section	Instructor 1	Instructor 2	Class Time
001	Quinn Minnich minnichq@msu.edu	Tsvetanka Sendova tsendova@msu.edu	Tu, Th 12:40 - 2:00 pm
002	Mark Roach roachma3@msu.edu	Joshua Ruiter ruiterj2@msu.edu	Tu, Th 2:40 - 4:00 pm
003	MInh Le leminh2@msu.edu	Michail Paporizos paporizo@msu.edu	W, F 10:20 - 11:40 am
004	Jinting Liang liangj26@msu.edu	Michail Paporizos paporizo@msu.edu	W, F 12:40 - 2:00 pm
005	Mike Annunziata annunzi1@msu.edu	Chuangtian Guan guanchua@msu.edu	W, Th 3:00 - 4:20 pm
006	Mike Annunziata annunzi1@msu.edu	Chuangtian Guan guanchua@msu.edu	W, Th 5:00 - 6:20 pm
All Sections: asynchronous lecture videos	Danika Van Niel vannield@msu.edu		Videos will be pre-recorded and posted on D2L
All Sections: synchronous lecture	Tsvetanka Sendova tsendova@msu.edu		Mondays 12:40 - 2:00 pm

Please check the D2L class page to find the Zoom link for your section.

Course structure

The main content delivery will be done in two ways:

- **Pre-recorded videos**, which will be posted by Friday, the week prior to the corresponding recitation classes;
- **Synchronous lecture on Mondays from 12:40 pm to 2:00 pm**, which will also be recorded and posted on D2L. Students from any section are welcome to attend this synchronous lecture and ask questions in real time.

The material covered in this lecture will be similar to the material covered in the pre-recorded videos, so students can choose the format that fits their schedule and learning style better. Please note that the problems students work on during recitation will be based on the material covered in lecture (or pre-recorded videos), so it is important that you either attend the live lecture or watch the videos.

Each section will **meet twice a week synchronously**. Students will work in groups on the problem worksheet for the day and receive feedback on their work from the course instructors.

Expectations

You are expected to be an active, hardworking, diligent, and competent learner. The average time each student is expected to spend outside of class, combined between the tasks of reading, going over examples from class and working on homework problems is **approximately 12 hours per week**. We expect you to ask lots of questions, to frequently visit office hours or the MLC, and above all, to be an engaged learner. By this we mean that you will engage in working with your peers in and out of class, and ask plenty of questions of your instructors. **To facilitate a productive interaction with your team members during the group work portion of the class**, we request that you have your camera and microphone on. If you feel uncomfortable with this request, please contact your instructors, so that they can find an appropriate alternative arrangement.

Course Objectives

This course acts as a bridge from your training in calculus which typically focuses on formulas and calculations to that of higher mathematics which focuses on abstraction, problem solving, and proof. You will be taught to think independently, to digest abstract concepts and tools from higher mathematics, and to communicate clearly in mathematical context - by writing mathematical proofs and explaining solutions to your peers. You will be expected to become proficient with the structure of mathematical logic, including truth tables, and you will be expected to become proficient in some basic styles of proof, such as: direct proof, proof by contradiction, proof by induction, proof by contrapositive, equivalences, and more.

Supplies

Computer

A laptop / desktop / tablet computer is required so that you can access all materials posted on D2L, attend class through Zoom, check your email, etc.

Internet

With this being an online class, [a decent internet connection is crucial](#).

WebCam

A webcam on your laptop / desktop is strongly recommended to facilitate the interaction with your instructors and peers.

Printer or Tablet (SUGGESTED)

Homework assignments will be submitted as PDFs through GradeScope. You can write your solutions by hand on paper, scan them and upload them, you can use a tablet to write your solutions, or you can type your solutions on LaTeX or Word.

Textbook (SUGGESTED)

No textbook is required for the class. Class notes, worksheets, and homework solutions will be provided D2L. Students who would like to access a textbook (for extra problems or another perspective on the topics) should consider ***How to Think Like a Mathematician***, by Kevin Houston.

Course Grades

Overall

Your course grade will be based on the maximum of the following two numbers:

Total Grade 1		Total Grade 2	
Post-video quizzes (12 total, lowest 4 dropped)	5%	Post-video quizzes (12 total, lowest 4 dropped)	5%
Recitation Worksheets (24 total, lowest 8 dropped)	15%	Recitation Worksheets (24 total, lowest 8 dropped)	15%
Homework (12 total, lowest 4 dropped)	10%	Homework (12 total, lowest 4 dropped)	10%
Mini-exam	6%	Mini-exam	6%
Midterm exam 1	10%	Lower Midterm	0%
Midterm exam 2	10%	Higher Midterm	10%
Final exam	14%	Final exam	24%
Portfolio	20%	Portfolio	20%
Portfolio defense	10%	Portfolio defense	10%

In addition, you must take the final examination in order to pass the course. Final grades will be determined by:

% Grade	4.0 Grade
[0,55)	0
[55,60)	1
[60,65)	1.5
[65,73)	2
[73,80)	2.5
[80,85)	3
[85,90)	3.5
[90,100]	4.0

This scale may be rescaled at the end of the semester to be more lenient. Such a rescaling is at the discretion of the instructor(s) and course supervisor.

Post-video Quizzes

Attending lecture or viewing the lecture videos as well as attending the synchronous recitations is extremely important to doing well in the class. There will be weekly short post-video quizzes which constitute 5% of the grade. These quizzes are meant to encourage you to keep up with the material and help you make sure you are prepared for that week's recitation activities. The quizzes with the lowest 4 grades will be dropped at the end of the semester.

Recitation Worksheets

Come to class, do the work, interact with your classmates, get some points. Easy as that. Worksheets constitute 15% of the final grade.

You will be routinely encouraged to ask questions of the instructors, and of your fellow students. You will be expected to share your thoughts and arguments with the rest of the class. Remember that this classroom is a safe space for you and your peers to share their thinking and to learn. The instructors will not tolerate any bullying or demeaning behaviors. If you ever feel like your voice is not valued or heard in class, please talk with your instructors or to the Course coordinator.

During each recitation class you will work in groups with your peers. In this class, mathematics is a social activity. Your instructors will assign you to various groups with your peers throughout the semester. You are expected to be an active member of these groups. You, along with your fellow group members, will collectively work on problems, and work to build collective understanding of various proving techniques. You will have access to common resources (virtual white board, your notes, example document, instructors help, etc.). You and your group mates will present your solutions to your classmates. You are encouraged to ask as many questions as needed (to both your classmates and the instructors), and to talk with everyone else as needed.

Worksheets will be graded based on a good-faith effort and contribution to the group discussion. It is completely okay to be wrong - this is why instructors are there - they will make every attempt to provide each group with sufficient feedback.

If you cannot make the synchronous recitation, **worksheets can be submitted individually on D2L within 24 hours**. Note that by submitting worksheets individually, outside of class, you will not have the opportunity to receive feedback on your solutions from your instructors. The worksheets with the lowest 8 grades will be dropped at the end of the semester.

Homework

Homework is easily the most important activity for learning in this course (and any mathematics course, really). As is often said, *mathematics is not a spectator sport!*, so the class is designed for students to stop watching people solve math problems, and work together or individually to solve problems themselves. Homeworks will be available on D2L on Monday of each week and will be due the Tuesday of the following week. **Your homework should be uploaded on Gradescope, unless otherwise indicated, by the due date listed on D2L (usually Tuesdays by 10 pm)**. Each homework will contain at least 2-4 problems. Your solutions will be graded by your instructors and you will be provided with feedback.

Think of a proof as your attempt to convince someone that a certain statement is true - therefore, you need to be convinced that you know what you are talking about and that your assertions are indeed true so that you can convince your peers/grader. Also, it is important that your homeworks and the arguments within are easily readable by your instructors. To facilitate this, you are required to turn in REWRITTEN final drafts of your homeworks. These final drafts must be generated after you have already worked out the problems on the homework. These final drafts must be clearly legible submitted through Gradescope as a single pdf file.

A special note on homework grading: There are many of you, and only two of us! So we will be unable to grade every homework problem which you hand in. We will make a selection of homework problems to grade each week at our discretion. We will do our best to provide solutions to the homework so that all of your hard work can be put to good use in learning/practicing the material in this course. The homeworks with the lowest 4 grades will be dropped at the end of the semester.

Mini-exam

The Mini-exam will be a relatively short take-home exam, tentatively scheduled for **Monday, September 24, 2020**, and will cover material presented in class up until that point. Note, the **last day to drop with a refund is Monday, September 29, at 8 pm**. The mini-exam is scheduled so that you can get some information about possibly dropping the class before the deadline. The Mini-exam is open-notes and no collaboration or use of outside resources is allowed.

Midterm exams

The two Midterm exams are tentatively scheduled for **Monday, October 12, 2020** and **Monday, November 16, 2020**. Both Midterm exams are take-home and open-notes. No collaboration or use of outside resources is allowed. Please refer to the [Spartan Code of Honor](#) and [Academic Integrity](#) policies.

More information about the structure of the exam including types of questions will be released as the exam gets closer.

Final Exam

By registering for this class, you understand that the final exam is a mandatory part of the course. The final exam is scheduled for **Wednesday, December 16, 2020, 7:45am - 9:45am ET**. The final exam will be take-home, open notes. The final is cumulative. More information about the structure of the exam including types of questions will be released as the exam gets closer. Those with another final exam scheduled during this time or three or more final exams scheduled on this day may **request an alternate final exam date / time** but must do so at least 1 week before the final exam date. All students are required to take the Common Final Exam to pass the course.

Portfolio

The portfolio is meant to help you create a big picture view of the class by summarizing the main proof techniques and most important logical equivalences and tools that will be used again and again in your future proof-based mathematics courses. We hope that this portfolio will be a mini-textbook written by you for you to use and add to in many of your future classes. The portfolio can be a collaborative effort, co-authored by up to three classmates (from the same section). A first draft (worth 2% of the final grade), including the first two sections of the portfolio is due on **Friday, October 23rd, 2020**. A second draft (worth 3% of the final grade), including revised first two sections, based on instructor feedback, as well as the third and fourth section of the portfolio is due on **Wednesday, November 25th, 2020**. The portfolio should be professional and needs to be typed in LaTeX or Word.

Portfolio Defense

While the portfolio may be a collaborative effort, the defense is individual. It is in the form of a 10-15 interview over Zoom, where your instructor(s) will ask you to present one or two of your portfolio sections and may ask you some clarifying questions on the proofs presented in the portfolio and on the essay-like sections included there.

Late/Missing Assignments and COVID Related Policies

Late/Missing Homework Policy

Late homework will not be accepted. Dropping the 4 lowest homework scores is meant to account for any unforeseen circumstances.

Late/Missing Exam Policies

Typically a missed exam is given a 0. Please make sure to arrive on time and prepared. All the (tentative) exam dates are announced well in advance. If a request for make-up is made prior to the scheduled exam date and documentation is provided for an University Excused absence, a make-up exam can be given within 48 hours of the original exam date.

Learning Continuity Statement

The Department of Mathematics and the MTH 299 teaching team understand and appreciate the exceptional circumstances and likely challenges this semester presents for many of you. To alleviate some stress and to account for any unforeseen circumstances, including illness, care for a loved one, loss of internet, etc., the grading scheme this semester is MUCH more flexible compared to regular semesters. The number of dropped quizzes, homework assignments, and worksheets is significantly larger than in past semesters. Students can miss close to 3 weeks of classes with little impact on their grades, so long as they learn the material they missed and display their knowledge of these topics on the final exam and portfolio defense. In addition, the lower midterm exam will be replaced by the score earned on the final exam, if this improves one's grade. Students missing work due to illness beyond the flexibility already afforded in the syllabus are advised to meet with an academic advisor to discuss the University's Medical Leave Withdrawal Policy and other avenues for support.

Given the uniform nature of the course, if an instructor becomes sick, his or her duties will be covered by one of the other team members, so no lapse instruction is anticipated to occur. If there are any changes to our teaching roster, students will be notified via email and D2L announcement.

Administrative Drop for Non-Attendance

Students will be dropped from this course for non-attendance by a departmental administrative drop after the fourth class period, or the fifth class day of the term of instruction, whichever occurs first.

Additional Help

Help Sessions

In addition to class and recitation the MTH 299 TAs will provide tutoring through Zoom. See D2L for hours and Zoom link.

Piazza

There is also a class forum, operated by Piazza, in which you can ask questions of your fellow classmates, the TA, and the instructor.

Find our class signup link at: <https://piazza.com/msu/fall2020/mth299>

It is recommended that when you have a homework question that you use this forum so that way everyone can see the response.

Hints for Success

A Suggestion From Dan: Dan was one of our most seasoned assistants for 299, and he has seen a lot of you guys struggle and succeed. Here are some suggestions from him.:

"Welcome to math 299. This course is going to be different than most math courses that you have previously taken and for this reason we are giving you a suggested weekly schedule for staying on top of work and concepts. The week "begins" on Monday when homework is assigned and new topics are introduced. It would be useful to go back through the material that is introduced on Monday while looking over the homework problems that have been assigned. This gives you the whole week to get through homework as well as you can on your own with help from the book and possibly office hours. Another useful thing to do during the week is look over solutions to previous examples that you did not fully understand. It is expected that you understand the examples. Without doing this you risk falling behind in the course. The rest of the course days will be work days in which you will be working through the example sheet and doing mathematics together and gaining understanding from each other and the process. After these two days you should be fully able to do any homework problem assigned and due Monday. After looking through and understanding the weekly examples, you should finish your homework assignment and have it ready for Monday. Be sure to ask lots of questions of your instructors and classmates so that you can more fully understand the proof techniques and concepts in this course! "

Often when the instructor or TA presents problems in class they are the polished solutions but in this class we need to realize that it takes a good amount of work to get to that point. It is a process!

Other Important Policies

There are many other important policies that deserve to be in here but the syllabus is already quite long. Check out these policies which we abide by via https://math.msu.edu/Classes/other_policies.aspx

Schedules and Dates

Important Dates

Weekday	Date	Event
Wednesday	9/2/2020	Class begins. We are following Monday's schedule.
Wednesday	9/9/2020	Open adds end (8:00pm)
Monday	9/28/2020	Last day to drop with refund (8:00pm)
Wednesday	10/21/2020	Last day to drop with no grade reported (8:00pm)
Thursday-Friday	11/26-27/2020	University Holiday
Friday	12/11/2020	Class Ends
Wednesday	12/16/2020	7:45 AM - 9:45 AM ET Final Exam

Tentative Weekly Schedule

This schedule is tentative. Your instructor will make any announcements about schedule changes during class or via email.

Week 1: Wed. 9/2 - Fri. 9/4	Lecture	Hello. What is this class about? Syllabus. Sets. Set operations.	
	Rec. 1	Working in groups on problems.	HW 0 Assigned - Practice Gradescope Assignment
Week 2: Tues. 9/8 - Fri. 9/11		No Class - note no class on Monday, Labor Day, but we still post videos	
	Video Lecture	Defining sets via "all x such that". More on set operations. Define quantifiers	Monday: HW 1 Assigned
	Rec. 1	30 min lecture; Sets/set operations worksheet	Tuesday: HW 0 Due
	Wed	<i>September 9th, 2020: Open adds end (8:00 PM)</i>	
Week 3: Mon. 9/14 - Fri. 9/18	Rec. 2	30 min lecture; Subsets/statements worksheet	
	Lecture	Negation of statements including such with quantifiers, negation of implication.	Monday: HW 2 Assigned
	Rec. 1	Quantifiers worksheet	Tuesday: HW 1 Due
Week 4: Mon. 9/21 - Fri. 9/25	Rec. 2	Negation/implication worksheet	
		Mini Exam - Monday at 6pm-8pm.	Monday: HW 3 Assigned
	Lecture	Contradiction and contrapositive	Tuesday: HW 2 Due
	Rec. 1	Contradiction worksheet	
Week 5: Mon. 9/28 - Fri. 10/2	Rec. 2	Contrapositive worksheet	
	Lecture	Induction	Monday: HW 4 Assigned
	Mon	<i>September 28th, 2020: Last day to drop with refund (8:00 PM)</i>	Tuesday: HW 3 Due
	Rec. 1	Induction worksheet 1	
Week 6: Mon. 10/4 - Fri. 10/9	Rec. 2	Induction worksheet 2	
	Lecture	Functions: domain, co-domain, assignment rule requirements, injection.	Monday: HW 5 Assigned
	Rec. 1	Injectivity proofs worksheet	Tuesday: HW 4 Due
Week 7: Mon. 10/12 - Fri. 10/16	Rec. 2	Practice and Review	
		Exam 1 - Monday 6pm-8pm	Monday: HW 6 Assigned
	Lecture	Surjection, Bijection, Inverses	Tuesday: HW 5 Due
	Rec. 1	Surjectivity proofs worksheet	
Week 8: Mon. 10/19 - Fri. 10/23	Rec. 2	Bijection, inverses worksheet	
	Lecture	Indexed unions and intersections, Bounded sets	Monday: HW 7 Assigned
	Rec. 1	Indexed unions and intersections worksheet	Tuesday: HW 6 Due
	Wed	<i>October 21st, 2020: Last day to drop with no grade reported (8:00 PM)</i>	
Week 9: Mon. 10/26 - Fri. 10/30	Rec. 2	Bounded sets worksheet	Friday: Portfolio Draft 1 Due
	Lecture	Unbounded sets (Archimedean property), Convergent sequences	Monday: HW 8 Assigned
	Rec. 1	Unbounded sets worksheet	Tuesday: HW 7 Due
Week 10: Mon. 11/2 - Fri. 11/6	Rec. 2	Convergent sequences worksheet	
	Lecture	MOD and Division Lemma	Monday: HW 9 Assigned
	Rec. 1	MOD worksheet	Tuesday: HW 8 Due
	Tue	<i>November 3rd, 2020: Election Day</i>	
Week 11: Mon. 11/9 - Fri. 11/13	Rec. 2	Division Lemma worksheet	
	Lecture	GCD	Monday: HW 10 Assigned
	Rec. 1	GCD worksheet	Tuesday: HW 9 Due
Week 12: Mon. 11/16 - Fri. 11/20	Rec. 2	Practice and Review	
		Exam 2 - Monday, 6pm-8pm	Monday: HW 11 Assigned
	Lecture	Equivalence relations, partitions, equivalence classes	Tuesday: HW 10 Due
Week 13: Mon. 11/23 - Wed. 11/25	Rec. 1	Equivalence relations worksheet	
	Rec. 2	Partitions, equivalence classes worksheet 1	
	Lecture	Equivalence relations, partitions, equivalence classes - continued	Monday: HW 12 Assigned
	Rec. 1	Partitions, equivalence classes worksheet 2	Tuesday: HW11 Due
Week 14: Mon. 11/30 - Fri. 12/4	Thu-Fri	<i>November 26th-27th, 2020: Thanksgiving - University Holiday</i>	Wednesday: Portfolio Draft 2 Due
	Lecture	Review	
	Rec. 1	Review	Tuesday: HW 12 Due
Week 15: Mon. 12/7 - Fri. 12/11	Rec. 2	Review	
	Lecture	Review	Tuesday: Portfolio Due
	Rec. 1	Review	
		Final Exam	