MATH 111 (Transition to Advanced Mathematics) Syllabus
Spring 2026

Instructor Information
Instructor Name: Maria Nogin
Department: Mathematics
Email / Telephone: mnogin@csufresno.edu, 559-960-9420 (cell)
Office: PB 340
Student Support Hours (aka Office Hours or Drop-in Hours): Mon 3:30-4:30, Tue 9:30-10:30, Wed 9:30-10:30, Thur 3:30-4:30, and by appointment

Course Information
Course Modality: In-person
Course ID: 35739 (11 am), 35716 (2 pm)
Units: 4
Class Meeting Time & Location: MTWTh 11-11:50 am, IT 288;
                                                            MTWTh 2-2:50 pm, IT 294
Canvas: fresnostate.instructure.com
Prerequisites: MATH 76 (Calculus II)
Course description: Introduction to the language and problems of mathematics. Use of LaTeX as a typesetting tool. Topics include set theory, symbolic logic, types of proofs, and mathematical induction. Emphasis on students constructing, explaining, and justifying mathematical arguments through active learning.

It is expected that students will spend approximately 2 hours of study time outside of class for every hour in class. Since this is a 4-unit class, you should expect to study an average of 8 hours outside of class each week.

Required Course Materials
Mathematical Proofs - A Transition to Advanced Mathematics, 4th edition, by G. Chartrand & others, Pearson, ISBN 978-0-134-76647-8.

Course Specifics
Course goals.
Upon completion of this course, students should know/understand:

- Importance of a formal, rigorous proof
- When it is sufficient to give an example/counterexample, and when an arbitrary element of a set must be considered
- Set operations (intersection, union, difference, complement) and their properties

- Meaning of logical operations (and, or, negation, implication) and quantifiers (universality and existence)
- Difference between different types of proof (direct, by contrapositive, by contradiction, by example/counterexample, etc.)
- Divisibility properties of integer numbers; congruences; basic properties of rational and irrational numbers
- The notions of a relation, equivalence relation; properties of equivalence classes
- The notions and properties of one-to-one, onto, bijective, inverse functions
- Principle of Mathematical Induction

Student Learning Outcomes.
Upon completion of this course, students will be able to do:

- Recognize simple statements that can be proved using one of the following techniques, and prove them:
    - direct proof
    - proof by contrapositive
    - proof by contradiction
    - vacuous proof
    - trivial proof
    - proof by cases
    - proof by example/counterexample
    - proof by Induction
- Determine the truth values of simple statements.
- Type mathematical texts in LaTeX.

Course Assignments:
There will be weekly <u>homework</u> due every Thursday at 11:59 pm. Be prepared to spend a few hours on each homework (you will learn to write mathematical proofs, polish your proofs, and type text in LaTeX - all of this takes time). You should write complete solutions, with all necessary proofs, and specific examples and counterexamples when appropriate, for each problem. Unsupported answers may receive zero credit. <u>All proofs must be rigorous</u> and written in complete sentences (use the style of proofs given in class and in the book) starting with Chapter 3. You should do homework in groups of 3-5 people. The groups do not have to be the same for the entire semester; you may switch groups if needed. However, in case you want to change your group, you should notify your group members well in advance (at least two weeks' notice is recommended). Write full names of all group members on the first page clearly. Please make sure that everyone in the group understands and agrees with all solutions. The primary goal of homework is to learn, so if someone else does a problem, you don't learn anything. <u>You need to actively participate</u> to make sure you learn well. The whole group will receive the same grade. If you have any questions or need someone to listen to and possibly comment on your ideas, please do not hesitate to ask your instructor (this is what her office hours are for!) Also, you are encouraged to work with any of your classmates, even if they are not in your group. However, your group has to <u>write all solutions by yourself</u>, in your own words. <u>No use of AI is allowed</u> for solving the problems or typing

your homework. No LaTeX smart editors or converters are allowed. You must type your homework in LaTeX, on Overleaf, entirely by yourself. Any copying will be considered cheating and will not be tolerated. More precisely, you will do your homework in an Overleaf project created by the instructor for your group. Make a new file within that project for each homework. Name the files "homework 1", "homework 2", etc. A draft is due by 3 PM on Monday. On Monday evening or Tuesday, your instructor will check your draft and give feedback on some problems. Because of the limited time, it won't be possible to check the entire homework. However, you are welcome to make requests. If you have any questions or wish the instructor to look at specific problems, please indicate so at the top of the document (preferably in a different color to make it easy to see). If you make requests, the instructor will prioritize accordingly. Otherwise, the problems will be checked in order. Keep in mind that if a problem contains multiple mistakes or concerns, not all of them may be identified in the feedback. Thus, the feedback is partial, aiming to point out some things you may still improve, not a comprehensive check of your homework. The better your draft is, the more you will get out of this feedback, and the better your final version is going to be. Continue working on your homework at any time before the deadline; however, you may not make any changes after the deadline. If any edits are made after the deadline, this will be considered cheating, and your homework will not be accepted. No late submissions will be accepted unless you are sick or have another serious and documented reason to delay homework (notify your group and instructor in advance if possible; provide a doctor's note or other documentation). Keep in mind that in case of a delay, you will most likely have to do the homework by yourself, as your group members will have to submit their homework on time.

Exams:
There will be three tests (50 minutes long each) and one final comprehensive exam (2 hours long). All exams will be individual; no collaboration or communication will be allowed. If, for any reason, you are unable to take a test at the scheduled time, please let your instructor know as soon as possible, and before the test if at all possible. In most cases, you will be expected to take the test before it is given in class. No late tests are given unless you have a serious and documented reason to miss class.

Attendance:
Class attendance is strongly encouraged and expected. In addition to new material, important course information will be given, homework may be discussed, and sometimes handouts may be distributed in class.

Grading policy:
Your grade for the course will be based on your performance on exams and homework. The number of points awarded for these is as follows. A grade of C or better is required to pass this class.

Assignment	Points
Homework	100
Test 1	50

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Assignment	Points
Test 2	50
Test 3	50
Final Exam	150
Total	400

Letter Grade	Points
A	360-400
B	320-359
C	280-319
D	240-279
F	0-239

Supplemental Instruction:
Supplemental Instruction (SI) is provided for all students enrolled in this course who want to improve their understanding of the material. SI sessions are led by a student who has already mastered the course material and been trained to facilitate group sessions where students can meet to compare class notes, review and discuss important concepts, develop strategies for studying, and prepare for exams. The SI leader attends this class and communicates regularly with the instructor to ensure that accurate information is given. Attendance at SI sessions is free and voluntary for any student enrolled in this course. Students may attend as many times as they choose.

The Supplemental Instruction (SI) leader and SI schedule for this class are below:

> SI Leader: Milani Stanton
> Email: milanistanton@mail.fresnostate.edu
> SI sessions:
> ● Wednesdays, 3:00-4:20 pm in the Learning Center,
> ● Fridays, 12:00-1:20 pm in UC 202.
> Walk-in hours: Mondays and Thursdays 3:30-5 pm in the Learning Center.
> SI sessions and walk-in hours start the week of January 26.

Extra help:
It is essential not to fall behind because most classes will use the material studied previously. If you have trouble with some material, seek help in the following ways:

● Ask me, either in class or privately. Don't be shy to ask questions. If you don't understand something, chances are very high that somebody else doesn't understand that either. So your classmates will be thankful to you for asking questions in class!

- Attend office hours. These are drop-in hours when I am in my office for sure, with my door open. If my posted office hours do not work for your schedule, make appointments. My contact info is listed on the first page of this syllabus.
- Questions about homework are welcome at any time. However, after you get help from me, you should put aside all the notes you made while talking to me, and write a complete solution from scratch, in your own words. I rarely write complete sentences during my office hours; I may only help you to find an approach, an idea. You are responsible for writing a complete solution.
- Work with your classmates. Working on your homework together is encouraged; however, every group should write down their solutions on their own. If somebody is helping you with your homework, then the same rules as for my helping you apply, i.e., you should put aside all the notes and write a complete solution from scratch, in your own words. That way, you will learn the best.
- Do also problems that were not assigned. Use the answers and hints in the back of the book to check your solutions.
- Attend the tutor lab. Here is the Math Department tutor lab schedule.

If you are having any difficulties, seek help immediately - don't wait until it is too late to recover from falling behind, or failing to understand a concept!

Requirements for an Incomplete Grade*: The grade of I is only appropriate when the student requesting it has completed a __minimum__ of two-thirds of the coursework with a passing grade. (APM 246)*

Course Policies & Safety Issues

In class, you are expected to pay attention (taking notes is strongly encouraged) and work solely on the in-class assignments. No talking on unrelated topics, reading of outside materials, or use of electronic devices (with very rare exceptions when the class works on LaTeX) is allowed. No audio or video recording in class is allowed. If you are absent from class, it is your responsibility to check on the material covered and announcements made while you were away.

Course AI Policy:
You may only use AI when learning new material or reviewing for the exams. Absolutely no AI use is allowed when working on homework. All work must be your own. You may not use AI to solve problems or to write LaTeX code.

Dispute Resolution:
If there are questions or concerns that you have about this course that you and I are not able to resolve, please feel free to contact the Chair of the department to discuss the matter.

> Chair's name: Dr. Carmen Caprau
> Department name: Mathematics
> Chair's email: ccaprau@csufresno.edu
> Department phone number: 559.278.2992

Intellectual Property:
All course materials, including but not limited to the syllabus, readings, quiz questions, exam questions, and assignments prepared by the instructor are property of the instructor and University. Students are prohibited from posting course materials online (e.g., Course Hero) and from selling course materials to or being paid for providing materials to any person or commercial firm without the express written permission of the professor teaching this course. Doing so will constitute both an academic integrity violation and a copyright violation. Audio and video recordings of class lectures as well as images of chat or messages shared during course sessions are prohibited unless I give you explicit permission in advance. Students with an official letter from the Services for Students with Disabilities office may record the class if SSD has approved that service. Otherwise, recordings of lectures are included in the intellectual property notice described above. These provisions exist regardless of the modality of the course. That is they apply to in-person, hybrid and online courses.

Safety:
Fresno State has continually focused on the safety and well-being of our campus community by following state and local public health guidelines as well as California State University policies. Any COVID-19-related questions or concerns can be directed to campus Office of Environmental Health & Safety/Risk Management at 559.278.8422 Additionally, listed below are resources and quick links regarding updates on the coronavirus, campus and community resources, testing sites and more.

- Visit the [Center for Disease Control (CDC) website for the latest updates on the virus](#).
- For updated regarding the Fresno State campus community and response, click [Fresno State Coronavirus Updates](#).

Please remember that the same student conduct rules that are used for in-person classroom instruction also apply for virtual/online classrooms. Students are prohibited from any unauthorized recording, dissemination, or publication of any academic presentation, including any online classroom instruction, for any commercial purpose. In addition, students may not record or use virtual/online instruction in any manner that would violate copyright law. Students are to use all online/virtual instruction exclusively for the educational purpose of the online class in which the instruction is being provided. Students may not re-record any online recordings or post any online recordings in any other format (e.g., electronic, video, social media, audio recording, web page, internet, hard paper copy, etc.) for any purpose without the explicit written permission of the faculty member providing the instruction. Exceptions for disability-related accommodations will be addressed by Student Disability Services working in conjunction with the student and faculty member.

University Policies

Students with Disabilities: Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the University Library, Room 1202 (278-2811).

Financial Aid Satisfactory Academic Progress Standards and Appeals Process:
https://studentaffairs.fresnostate.edu/financialaid/policies/sap/index.html

The following University policies can be found on the web at:
- Adding and Dropping Classes
- Cheating and Plagiarism
- Computers
- Copyright Policy
- Disruptive Classroom Behavior
- Honor Code
- Title IX

Fresno State is committed to fostering a safe, productive learning environment for all students. Title IX and CSU policy prohibit discrimination on the basis of sex, which includes sexual harassment, domestic and dating violence, sexual assault, sexual exploitation, and stalking. We understand that sexual violence can impact a students' *ability to be successful* in the learning environment. We encourage students who have experienced sexual misconduct *to seek information on where to report from any member of our faculty or staff in order to ensure that the university can provide students with the necessary resources and supportive measures.*

As an instructor, I have a mandatory reporting responsibility as a part of my role. It is my goal that you feel comfortable sharing information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the extent possible. However, I am required to report any information I receive regarding sexual misconduct or information about a crime that may have occurred during your time at Fresno State.

Students can report incidents of alleged sexual misconduct to either or both of the following resources:
Office of Compliance and Civil Rights | occr.fresnostate.edu | 559.278.5003
Fresno State Police Department | fresnostate.edu/police | 559.278.8400

Students can also report other incidents of discrimination or harassment to:
Office of Compliance and Civil Rights | occr.fresnostate.edu | 559.278.5003

Students can access *confidential support* from two separate resources on campus:
Counseling Services | studentaffairs.fresnostate.edu/health/counseling | 559.278.2734
Survivor Advocacy Services | fresnostate.edu/survivoradvocate | 559.278.6796

Pregnancy or Related Conditions:
Pregnant Students *or those with related conditions should contact the Title IX Coordinator in the Office of Compliance and Civil Rights for assistance. The Title IX Coordinator can coordinate specific actions to prevent sex discrimination and ensure the student's equal access to educational programs or activities.*
Office of Compliance and Civil Rights | occr.fresnostate.edu *| 559.278.5003*

Parent scholars *provides information on priority registration and other support for parenting students.*

Services for Students with Disabilities *can also provide assistance with accommodations.*

If you have concerns and you are unsure who to contact, please visit the Concern & Action Guide.

Emergency Information: In the event of an emergency, everyone in the campus community becomes a partner in the response. To ensure you are prepared and remain calm you must make yourself familiar with campus protocols. To contact the Fresno State Police Department call 559.278.8400 from your cell phone or 911 from a campus phone. Prior to an emergency, assess your environment for options depending on the emergency. Identify all possible exit routes, in an emergency always use the closest most safe exit. Once you exit the building go to the predetermined evacuation assembly point, if that is unavailable then go to an open safe space away from the emergency. Identify where and how you can secure yourself inside if you need to shelter in place or hide from a threat. Be prepared to help guide those around you and assist individuals who may be in need. Additional information can be found at www.fresnostate.edu/emergency.

University Services

The following University services can be found on the web at:
- Associated Students, Inc.
- Students with Disabilities
- Dream Success Center
- Library
- Learning Center Information
- Student Health and Counseling Center
- Academic Success Coaching
- Survivor Advocacy
- Writing Center
- Project Rebound

Subject to Change Statement

This syllabus and schedule are subject to change in the event of extenuating circumstances.

Tentative Course Schedule

Date	Book section and topic (read the book section before class)	Problems recommended but will not be graded (do not turn in)	Homework due via Overleaf by 11:59 PM
Tue, Jan 20	Introduction Syllabus		
Wed, Jan 21	Ch. 0. Communicating mathematics		
Thu, Jan 22	Latex. Overleaf. Sample file	Make a copy of the sample file and practice writing any math text	
Mon, Jan 26	Ch. 1. Sets 1.1, 1.2	1.3, 1.5, 1.7, 1.13, 1.15, 1.17, 1.21	Send the names of your group members to your instructor (by email) to have your Overleaf project created
Tue, Jan 27	1.3, 1.4	1.23, 1.25, 1.27, 1.35, 1.37, 1.41, 1.45	
Wed, Jan 28	1.5, 1.6	1.49, 1.51, 1.53, 1.55, 1.59, 1.61, 1.63, 1.65	
Thu, Jan 29	Ch. 2. Logic 2.1, 2.2, 2.3	2.1, 2.5, 2.9, 2.13, 2.15, 2.17	
Mon, Feb 2	2.4, 2.5	2.21, 2.29, 2.31	
Tue, Feb 3	2.6, 2.7	2.35, 2.39, 2.41, 2.47, 2.49	
Wed, Feb 4	2.8	2.53, 2.55, 2.57	
Thur, Feb 5	2.9	2.61, 2.63, 2.65	Homework 1 1.2(ac), 1.4(ac), 1.6(ab), 1.12, 1.18, 1.22, 1.24, 1.32, 1.38, 1.56, 1.62 Homework 1 template
Mon, Feb 9	2.10	2.67, 2.71, 2.75, 2.81	
Tue, Feb 10	2.11	2.83, 2.85	
Wed, Feb 11	Ch. 3. Direct proof and proof by contrapositive 3.1	3.1, 3.3, 3.5, 3.7	
Thu, Feb 12	3.2	3.9, 3.11, 3.13	Homework 2 2.3, 2.14(cde), 2.18, 2.22(ab), 2.32(ab), 2.38, 2.42, 2.46, 2.48
Mon, Feb 16	(Holiday - President's Day, no class)		
Tue, Feb 17	3.3	3.17, 3.19, 3.21, 3.23	
Wed, Feb 18	3.4	3.27, 3.31, 3.33, 3.37, 3.39	

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Date	Book section and topic (read the book section before class)	Problems recommended but will not be graded (do not turn in)	Homework due via Overleaf by 11:59 PM
Thu, Feb 19	3.5	3.41, 3.43, 3.44, 3.45	Homework 3 2.54, 2.60, 2.62, 2.70, 2.72 (2 pts, justify your answers), 2.76, 2.80, 2.84
Mon, Feb 23	Ch. 4. More on direct proof and proof by contrapositive 4.1	4.1, 4.3, 4.5, 4.7, 4.9, 4.13	
Tue, Feb 24	4.2	4.15, 4.19, 4.21	
Wed, Feb 25	4.3	4.25, 4.27, 4.29, 4.31, 4.35, 4.37	
Thu, Feb 26	**Review of ch. 0-3**		Homework 4 3.4, 3.6, 3.10, 3.16, 3.18, 3.20, 3.26, 3.30, 3.34, 3.36 Starting with this homework, all solutions and proofs have to be written in complete sentences.
Mon, Mar 2	**Test 1 (covers chapters 0-3)**		
Tue, Mar 3	4.4	4.43, 4.45, 4.47, 4.49	
Wed, Mar 4	4.5	4.53, 4.55, 4.57	
Thu, Mar 5	4.6	4.63, 4.65, 4.67, 4.69	Homework 5 4.4, 4.6, 4.8, 4.10, 4.12, 4.16, 4.18, 4.26, 4.28, 4.30
Mon, Mar 9	Ch. 5 Proof by contradiction 5.1	5.1, 5.3, 5.5	
Tue, Mar 10	5.2	5.13, 5.15, 5.17, 5.19, 5.21, 5.25, 5.27, 5.29, 5.33	
Wed, Mar 11	5.3	5.37, 5.41	
Thu, Mar 12	5.4	5.43, 5.49	Homework 6 4.36, 4.40, 4.42, 4.46, 4.48, 4.54, 4.56, 4.64, 4.66, 4.68
Mon, Mar 16	5.5	5.55, 5.57	
Tue, Mar 17	Ch. 6 Mathematical induction		
Wed, Mar 18	6.1	6.4(2), 6.5, 6.9, 6.13	
Thu, Mar 19	6.2	6.21, 6.25, 6.27, 6.29	Homework 7 5.2, 5.4, 5.12, 5.18, 5.20, 5.26, 5.36, 5.40, 5.42, 5.48(a)

Date	Book section and topic (read the book section before class)	Problems recommended but will not be graded (do not turn in)	Homework due via Overleaf by 11:59 PM
			for extra credit: 5.24, 5.34, 5.48(b)
Mon, Mar 23	6.3	6.33, 6.35, 6.37	
Tue, Mar 24	Drawing geometric shapes in LaTeX		
Wed, Mar 25	Ch. 8. Prove or disprove 8.1	8.1, 8.3, 8.5	
Thu, Mar 26	**Review of chapters 4-6**		Homework 8 5.50, 5.56, 5.63, 6.4(1), 6.6(b), 6.10, 6.12, 6.16, 6.26, 6.34 for extra credit: 5.58, 6.8, 6.36(b), 6.56
Mon, Mar 30			
Tue, Mar 31	Spring Break		
Wed, Apr 1			
Thu, Apr 2			
Mon, Apr 6	**Test 2 (covers chapters 4-6)**		
Tue, Apr 7	8.2	8.15, 8.17, 8.19, 8.21, 8.23	
Wed, Apr 8	8.3	8.31, 8.33, 8.35, 8.37, 8.41, 8.43, 8.45, 8.55, 8.59, 8.61, and any other odd-numbered problems	
Thu, Apr 9	Ch. 9. Equivalence relations 9.1	9.1, 9.3, 9.5, 9.7	
Mon, Apr 13	9.2	9.11, 9.13, 9.15, 9.17, 9.19, 9.23	
Tue, Apr 14	9.3	9.25, 9.27, 9.29, 9.33	
Wed, Apr 15	9.4	9.37, 9.39, 9.41	
Thu, Apt 16	9.5	9.45, 9.47, 9.53	Homework 9 8.2, 8.6(ab), 8.14, 8.16, 8.26, 8.32, 8.34, 8.36, 8.50, 8.56, 8.60 for extra credit: 8.8 (2 pts)
Mon, Apr 20	9.6	9.55, 9.59, 9.61	

Date	Book section and topic (read the book section before class)	Problems recommended but will not be graded (do not turn in)	Homework due via Overleaf by 11:59 PM
Tue, Apr 21	Ch. 10. Functions 10.1	10.3, 10.7, 10.11, 10.13	
Wed, Apr 22	10.2	10.19, 10.21, 10.23, 10.25, 10.27	
Thu, Apr 23	10.3	10.31, 10.33	Homework 10 9.4, 9.12, 9.14, 9.16, 9.26, 9.28, 9.38, 9.42, 9.52, 9.56 for extra credit: 9.18
Mon, Apr 27	10.4	10.37, 10.39, 10.41, 10.43, 10.47	
Tue, Apr 28	10.5	10.49, 10.51, 10.53, 10.55, 10.59, 10.61, 10.62	
Wed, Apr 29	More combinatorics problems		
Thu, Apr 30	**Review of chapters 8-10**		Homework 11 10.8, 10.12(ce), 10.26, 10.32, 10.42 (2 pts), 10.52, 10.56, 10.60
Mon, May 4	**Test 3 (covers chapters 8-10)**		
Tue, May 5	More epsilon and delta proofs		
Wed, May 6	Review for the Final Exam (Last Day of Instruction)		

Finals week	Dates
Final Exam Preparation & Faculty Consultation Days:	Thu, May 7 and Fri, May 8
Dr. Nogin's Consultation Hours	Thu, May 7, TBD Fri, May 8, TBD
Final Semester Examinations	Mon, May 11 through Thu, May 14
Final Exam in this course	Mon, May 11, 11 AM-1 PM (11 AM section), Wed, May 13 3:30-5:30 PM (2 PM section)