



Texas A&M University - San Antonio
Math 3325 Introduction to Mathematical Proofs
Fall 2026

Instructor:	Dr. Craig McCarron
Office:	Madla Hall 336B
Office Hours:	MW 3:30-5:30 or by appointment
Class Meets	MW 9:30 – 10:45 Classroom Hall 110
Phone:	210.784.2648
Email:	Craig.McCarron@tamusa.edu
Course Website:	Blackboard
IMPORTANT NOTE: TO CONTACT THE INSTRUCTOR, USE EMAIL TO EITHER Craig.McCarron@tamusa.edu. YOU SHOULD RECEIVE A RESPONSE TO EMAIL IN AT MOST ONE BUSINESS DAY. DO NOT USE BLACKBOARD MESSAGING TO CONTACT THE INSTRUCTOR, IT IS NOT RELIABLE.	

Catalog Description:

This course is a study of the principles and techniques of interpreting, discovering and writing correct mathematical proofs. Students learn to independently prove theorems from various areas in mathematics, which may include topics from logic, the structure of the real number system, number theory, geometry and algebra. TSI Restriction(s): Reading, Math, and Writing

Prerequisites: [MATH 2313](#), [MATH 2113](#) with a grade of "C" or higher.

Credits: 3

Instructor Philosophy:

This should be an enjoyable course, perhaps the most enjoyable course you have taken in your academic life so far. You should leave class looking forward to working the assigned problems, because the problems will be challenging and you will be equipped to tackle them. "Confusion is not a characteristic of efficient learning." If you are confused or not enjoying this course, please talk to the instructor about it.

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- **Logic & Formal Language:** Translate complex verbal statements into formal symbolic logic involving propositional connectives and quantifiers ($\forall, \exists$), and construct truth tables to evaluate logical equivalence, tautologies, and negations.

- **Set Theory Operations:** Apply definitions of sets, subsets, power sets, Cartesian products, indexed families, and set operations to prove set identities and containment relationships.
- **Core Proof Strategies:** Select and execute appropriate proof techniques—including direct proof, proof by contrapositive, proof by contradiction, and proof by cases—to establish mathematical assertions.
- **Induction Methods:** Formulate and write rigorous proofs using the Principle of Mathematical Induction, Strong Induction, and the Well-Ordering Principle.
- **Relations & Equivalence Classes:** Analyze properties of relations (reflexive, symmetric, transitive) to identify equivalence relations, construct equivalence classes, and work with integers modulo n .
- **Functions & Mapping:** Demonstrate understanding of injectivity, surjectivity, bijectivity, function composition, and inverse functions using rigorous ϵ - δ style or general element-wise proofs.
- **Cardinality:** Compare the cardinalities of finite and infinite sets, distinguishing between denumerable (countably infinite) and uncountable sets, and apply theorems like the Schröder-Bernstein Theorem.
- **Counterexamples & Disproof:** Evaluate the validity of proposed proofs, identify logical fallacies, and construct precise counterexamples to refute false conjectures.
- **Domain-Specific Applications:** Apply proof methods to foundational topics in elementary number theory (divisibility, Euclidean Algorithm), combinatorics, or introductory analysis/calculus (ϵ - N sequence limits).
- **Mathematical Writing:** Produce clean, grammatically correct, and logically structured mathematical prose following standard conventions for notation, mathematical layout, and logical flow.

Course Materials

Textbook: *Mathematical Proofs: A transition to advanced mathematics* by G. Chartrand, A. Polimeni, P. Zhang, 4th edition

List of Topics: Topics to be covered include but are not limited to the following:

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1. Sets
2. Logic
3. Direct Proof and Proof by Contrapositive
4. More on Direct Proof and Proof by Contrapositive
5. Existence and Proof by Contradiction
6. Mathematical Induction
7. Reviewing Proof Techniques

8. Prove or Disprove
9. Equivalence Relations
10. Functions
11. Cardinalities of Sets

The instructor reserves the right to modify/update the topics as appropriate.

COURSE WORK & GRADING:

Participation: Active participation & cooperation in class is essential for your success as an individual student & our success as a class.

Problem Sets: There will be ten Problem Sets assigned during the semester, each worth 20 points. Problem Sets will be turned in on 8.5" × 11" paper, stapled in the upper right corner. Do not turn in paper with perforated edges. Due to the unpredictability of pacing in a college mathematics course, due dates will be given in class as each chapter's lectures are complete. Students *must* budget time to complete assignments. Assignments will include even- and odd-numbered problems. Most of the answers to odd-numbered problems are given in the back of the book. Students are expected to check their answers as they go to be sure they are on the right track while working assignments. Due to the complexity of some problems in this class, some problems will require extended thought to solve. Start assignments early to allow for this extended thought.

Quizzes: There will be a short 10-point quiz approximately every other week. Quizzes are intended to assess students' mastery of course student learning outcomes. At the end of the semester, the lowest quiz score will be dropped from the semester average.

Dropped scores: No Homework will be accepted late and there will be no make-up quizzes. Students are expected to make lecture meetings a high priority and attend every class meeting. To adjust for serious illness, emergencies, and just plain bad days, the lowest Problem Set score and the lowest quiz score will be dropped at the end of the semester.

Midterm Exam: There will be a cumulative midterm exam on October 7th. It is worth 100 points.

Final Exam: In order to pass this class, students *must* take a comprehensive final exam scheduled during Finals Week. Finals cannot be rescheduled or missed (for dire & unforeseen medical or family emergencies, students must consult with the instructor).

Exam Schedule:

Exam	MATH 3325
Midterm Exam	7 October
Final Exam	To Be Determined*

(The above dates are subject to change at the discretion of the instructor. Every effort will be made to give students at least one week of warning if an exam date must be changed.)

Note: All quizzes and exams are *cumulative*. You can expect questions to cover material from the first day of the course to the day before the quiz or exam.

*There are some faculty concerns regarding the original Final Exam schedule which was initially published. We will wait until those concerns are resolved before publishing our final exam schedule.

GRADING POLICY

Scoring:

category	number	points each	drops	total
Problem Sets	10	20	1	180
Quizzes	6	10	1	50
Midterm Exam	1	100	0	100
Final Exam	1	100	0	100
			Total	430

(All numbers above are approximate and subject to adjustments.)

Grade Scale for MATH 3325: 90 – 100% = A; 80 – 89% = B; 70 – 79% = C; 60 – 69% = D Below 60% = F

The grading policy may be amended during the semester at the instructor's discretion.

COURSE REQUIREMENTS & EXPECTATIONS

Class Attendance: Attending class is **mandatory**. To be counted present, the student must be in class and must have submitted all due assignments.

Gradebook: The official gradebook will be a spreadsheet in a Blackboard folder, NOT the Blackboard "My Grades" link.

Make-up Policy: There are no make-ups, however low scores in each category except exams will be dropped. You are expected to always be present for exams. Exams must be taken on the date specified. **No make-up exams will be given.**

Dropping the Course: It is the student's responsibility to drop a course. The instructor may not automatically drop you. Please check the academic calendar webpage of TAMU-SA for the last

day to drop a course or withdraw from the university. Please contact the Welcome Center at 784-1300 if you desire to drop the course.

Blackboard: Students are responsible for checking Blackboard regularly for announcements, assignments, & other support materials posted there. However, students are also responsible for all announcements & assignments which are given in the classroom. Please use the professor's TAMUSA e-mail if you need to communicate with the instructor.

NOTE: There will NOT be an extra credit assignment, please DO NOT ask for it at the end of the semester. Start studying today! You have enough time to get the perfect grade. To be successful in this course, take responsibility for your learning & plan to study at least 2 hours for each class hour. Do not get behind; do not hesitate to ask for help. Make good use of the resources that are available to you, especially your book & your instructor. Save all your graded assignments, exams & quizzes until you receive your final grade.

Electronic Devices: The use of phones or other electronic devices for non-class related activities is not allowed. Anyone who is observed text messaging or using an electronic device during class for a non-class related purpose will be given a warning, and as a further action that person will be asked to drop the class. Devices should be turned off and put away during exams & quizzes.

CLASS RULES:

1. Regular participation and attendance is VERY IMPORTANT in this class! You are enrolling in a THREE HOUR math course, so expect to work on your mathematics work very frequently. Failure to complete work will result in lower grades.
2. You should be doing homework, worksheets, and/or quizzes daily. Optional activities such as study plan or videos do not satisfy the participation requirement. To be counted as "present", you must attend class and complete all assigned work.
3. If you need additional help, please ask! Your instructor is available to help both in-class & during office hours, and students also have access to free online tutoring through Jaguar Tutoring in the ALC.

IMPORTANT POLICIES AND RESOURCES

University Email Policy and Course Communications: All correspondence between professors and students must occur via university email accounts. You must have your Jaguar email account ready and working. If it is not working, contact the help desk at helpdesk@tamusa.edu or at 210-784-HELP (4357). If you don't hear back within 48 hours, contact them again. They have many requests during the first part of the semester, so you may need to follow up with them.

Academic Accommodations for Individuals with Disabilities: Texas A&M University-San Antonio is committed to providing all students with reasonable access to learning opportunities and

accommodations in accordance with The Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, Disability Support Services is located in the Central Academic Building, Suite 210. You can also contact us via phone at (210) 784-1335, visit us at the [website](#) or email us at dss@tamusa.edu. All students are encouraged to discuss their academic accommodation with Disability Support Services and their instructors as soon as possible.

Academic Learning Center: All currently enrolled students at Texas A&M University-San Antonio can utilize the Academic Learning Center for subject-area tutoring. The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University-San Antonio. Students wishing to work with a tutor can make appointments through the Brainfuse online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu, calling (210) 784-1307, or visiting the Central Academic Building, room 202. Online tutoring is also available for after hours and weekend assistance.

While tutoring hours may change based on tutor schedules and availability, the current tutoring hours for MATH in the ALC are as follows:

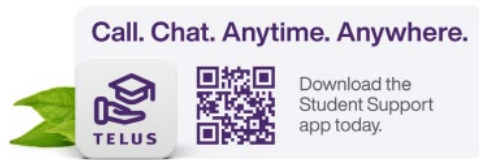
Appointments available MATH Walk in Tutoring – No appointment needed

	Appointments available	Walk in Tutoring – No appointment needed
MONDAY	8 am – 6 pm	9 am – 5 pm
TUESDAY	8 am – 6 pm	9 am – 5 pm
WEDNESDAY	8 am – 6 pm	9 am – 5 pm
THURSDAY	8 am – 6 pm	9 am – 5 pm
FRIDAY	8 am – 5 pm	11 am – 4 pm

Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment, visit our website, call 210-784-1331 or visit Madla 120 between the hours of 8:00 AM and 5:00 PM.

All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services. *Crisis support is available 24/7/365 by calling the SCC at 210-784-1331 or through the TELUS student support App.*

The TELUS Student Support App provides a variety of mental health resources to including 24/7/365 support for in the moment distress, crisis support, an anonymous peer-to-peer support network, mental health screenings, podcasts, and articles to improve your mental wellbeing.



Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification system. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>. More information on emergency response may be found at: [Emergency Operations Plan](#) and the [Emergency Action Plan](#). Download the SafeZone App (<https://safezoneapp.com/>) for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900.

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended by the published Census Date (the first week of class). Any student receiving federal financial aid who does not attend prior to the published Census Date (the first week of class) will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Jaguar Writing, Language, and Digital Composing Center (WLDCC): The WLDCC provides support to graduate and undergraduate students in all three colleges as well as faculty and staff. Writing tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. The WLDCC offers face-to-face, synchronous online, and asynchronous digital appointments. Students can schedule appointments with the WLDCC in JagWire under the Student Services tab. Click on "Writing, Language, and Digital Composing Center" to make your appointment. Students wanting to work in realtime with a tutor can schedule an "Online Appointment." Students wishing to receive asynchronous, written feedback from a tutor can schedule an "eTutoring" appointment. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our [website](#) . The WLDCC can also be reached by emailing wldcc@tamusa.edu.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to submit a [CARE report](#) for support. Furthermore, please notify the professor if

you are comfortable in doing so. This will enable them to direct you to available resources. A food pantry is available on campus; click [here](#) for hours and contact information.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to visit the Office of Military Affairs for any question involving federal or state VA Education Benefits. Visit the Patriots' Casa building, room 202, or to contact the Office of Military Affairs with any questions at military.va@tamusa.edu or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the wide variety of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or course work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop does not affect the student's GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as "F" grades and will impact the student's GPA.

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equal opportunity, and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality and the uniqueness of the individual on our campus and within our state, nation, and world. All decisions and actions involving students and employees are to be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the University's Civil Rights Officer at 210-784-2061 or titleix@tamusa.edu.

Texas A&M University-San Antonio faculty are committed to providing a safe learning environment for all students and for the university as a whole. If you have experienced any form of sex discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking based on sex, know that help and support are available. A&M-San Antonio's Title IX Coordinator can support those impacted by such conduct in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the Title IX Coordinator. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment,

sexual violence, or other related sex-based misconduct, the faculty member must share that information with the university's Title IX Coordinator (titleix@tamusa.edu, 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide such reasonable accommodations to pregnant students as would be provided to a student with a temporary medical condition that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the Title IX Coordinator with any questions or concerns related to their status (titleix@tamusa.edu; 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources.

Young Jaguars can support parenting students with daycare if students meet this criteria: (1) must be enrolled in classes at Texas A&M-San Antonio in the current semester, (2) must be Pell eligible or a single parent, (3) child(ren) must be aged 3 to 12-years-old, and (4) child(ren) must be enrolled in Pre-K-3 through 6th grade. Hours of operation is Monday-Thursday 3:30pm-9:00pm. For more information, please contact Young Jaguars at youngjaguars@tamusa.edu or call (210) 784-2636.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

Students' Rights

1. A student shall have the right to participate in a free exchange of ideas, and there shall be no University rule or administrative rule that in any way abridges the rights of freedom of speech, expression, petition and peaceful assembly as set forth in the U.S. Constitution.
2. Each student shall have the right to participate in all areas and activities of the University, free from any form of discrimination, including harassment, on the basis of race, color, national or

ethnic origin, religion, sex, disability, age, and pregnancy/parenting or veteran status in accordance with applicable federal and state laws.

3. A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
4. Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

Students' Responsibilities

1. A student has the responsibility to respect the rights and property of others, including other students, the faculty, and administration.
2. A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, [Student Code of Conduct](#), on our website, and University Catalog, and to comply with them, as well as with federal, state, and local laws.
3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
4. A student has the responsibility to recognize the University's obligation to provide a safe environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notifications.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, or disability. Conduct that infringes on the rights of another individual will not be tolerated.

Students are expected to exhibit a high level of honesty and integrity in their pursuit of higher education. Students engaging in an act that violates the standards of academic integrity will find themselves facing academic and/or disciplinary sanctions. Academic misconduct is any act, or attempt, which gives an unfair advantage to the student. Additionally, any behavior specifically prohibited by a faculty member in the course syllabus or class discussion may be considered as academic misconduct. For more information on academic misconduct policies and procedures please review the [Student Code of Conduct](#) or visit the resources available in the [OSRR website](#)

Important Fall 2026 Dates:

Dates	Event
August 20	Tuition & Fee Payments deadline
August 24	First day of class
September 7	Labor Day Holiday – No Classes / University Closed

September 9	Census Date – Students not paid in full or enrolled in a payment plan by 4:59 pm may be dropped for non-payment
October 5 – October 16	Midterm grading period
November 13	Last day to drop with an automatic “W”
November 25	Study Day – No classes
November 26-November 28	Thanksgiving Holiday – No Classes / University Closed
November 30	Last day to drop a course or withdraw from the University
December 4	Last day of classes
December 5 – December 11	Final exams
December 15	Commencement

The complete [academic calendar](#) is available online

Artificial Intelligence (AI) Policy

Option 1 - No Use of Generative AI Permitted

[Insert Course Number] assumes that all work submitted by students will be generated by the students themselves, working individually or in groups. Students should not have another person/entity do the writing of any portion of an assignment for them, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio’s standards of academic integrity.