Course Information

Course Number:	Math 300
Course Title:	Foundations of Mathematics
Time:	Section 902: TR 9:35-10:50
	Section 905: TR 11:10-12:25
Location:	Blocker 148
Credit Hours:	3

Instructor Details

Instructor:	Oksana Shatalov
Office:	Blocker 360C
E-Mail:	Please use the Inbox tool in Canvas to write to me about Math 300. Other correspondence can be directed to shatalov@math.tamu.edu
Office Hours:	*Wednesday 1pm-2pm, Friday 2pm-3pm, and by appointment.* During the Fall 2021 semester, I will hold office hours via Zoom. The ZOOM link will be available in Canvas.

Course Description

Foundations of mathematics including logic, set theory, functions, and number theory.

Course Prerequisites

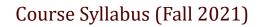*Grade of C or better in MATH 148, MATH 152 or MATH 172, or equivalent.*

Special Course Designation

This is a W (writing intensive) course, which means that close attention will be paid to students' ability to write mathematical statements and proofs mathematically and grammatically correctly. About one third of the grade will depend on the writing. Since this is a W course, no student can pass the course without a passing grade on the writing portion (see below).

Course Learning Outcomes

The purpose of the course is to provide students with important foundational skills that will prepare them to be successful in higher level courses. Upon successful completion of the course, students will:

- *Be able to construct and organize their mathematical reasoning.*
- *Develop skills for reading and writing mathematical proofs.*
- Recognize and identify frequently used types of proofs.
- Master several mathematical concepts from logic and set theory.
- Identify concrete situations where the newly learned techniques can be applied.
- Recognize and recall the main definitions and results explained in the course.
- Develop problem-solving skills.
- *Be expected to present simple proofs, definitions, and statement of theorems.*

Textbook and Resource Materials

TEXTBOOK: *Tamara J. Lakins, The Tools of Mathematical Reasoning, American Mathematical Soc., 2016, ISBN 1470428997, 9781470428990. An electronic version of the textbook is available on the TAMU Library website.*

Note: The instructor will be providing examples and recommendations concerning math writing.
- The following little book (**not required)** is a good source for many such recommendations: Donald E. Knuth, Tracy Larrabee, Mathematical Writing, The Mathematical Association of America 1989. ISBN 978-0883850633.

Some other books of this kind:
- Norman E. Steenrod, Paul R. Halmos, et al, How to Write Mathematics, Amer. Math. Soc. 1973. ISBN-13: 978-0821800553. (A collection of articles by famous mathematicians concerning writing.)
- Nicholas J. Higham, Handbook of Writing for the Mathematical Sciences, SIAM 1998. ISBN-13: 978-0898714203
- Steven Krantz, A Primer of Mathematical Writing: Being a Disquisition on Having Your Ideas Recorded, Typeset, Published, Read & Appreciated
- And here is the timeless treasure: a tiny beautiful book on writing: William Strunk Jr., E. B. White, The Elements of Style, Longman 1999 (there are zillions of other editions). ISBN-10: 020530902X, ISBN-13: 978-0205309023

TECHNOLOGY: You will need to scan and upload some of your written work as a PDF (this can be achieved with a cell phone or other technology). Course notes and other materials will be posted on Canvas.

If the university moves to on-line instruction, then exams will be proctored on-line over Zoom. To do this, the following technical requirements are needed:
- Appropriate hardware (laptop or desktop computer, a second device such as a mobile phone, high-speed internet connection)
- Appropriate software (PDF reader, Zoom on phone and computer, the latest update on an internet browser-Chrome or Firefox are recommended)

TEXAS A&M STUDENT ID: Bring your student ID to each class/exam. If you have a question about your grade, please bring your ID when we talk.

Grading Policy

- The course grading will be based on the tables below. At the end of the semester, you will receive the grade you earned, according to the scale given. Due to FERPA privacy issues, I cannot discuss grades over email or phone. If you have a question about your grade, please schedule a one-on-one Zoom meeting with me.
- Since this course is an official *Writing Course*, about 1/3 of the grade is based on your ability to communicate your ideas. The most obvious way in which the "1/3" will be manifested is through specific assignments and papers in which writing will play an integral part. However, writing communication skills will also be considered in the normal course of grading homework and exams.

- **Grade Ingredients**

ACTIVITY	%	POLICIES AND REMARKS
Two Midterm Exams	32	• Highest Midterm Exam – 18%; Lowest Midterm Exam – 14% • **Dates**: Exam 1 – **October 5 (Tuesday)** Exam 2 – **November 9 (Tuesday)**
Homework	10	Homework assignments (HW) will be due the following Thursdays: _See table below_ Homework must be turned in electronically on time. For full credit on the homework, you must show all work and justify your answers. Emphasis will be placed on writing carefully and precisely. Other submission guidelines will be posted separately in Canvas. Note that homework assignments may have different weight. At the and a portion corresponding to 1/10 of total points for homework will be dropped.

Homework due table:

HW	1	2	3	4	5	6	7	8	9	10
due	Sep 9	Sep 16	Sep 23	Sep 30	Oct 14	Oct 21	Oct 28	Nov 4	Nov 18	Nov 27

ACTIVITY	%	POLICIES AND REMARKS
Writing Assignments 1-4	10	A series of four _Writings Assignments (WA)_ will be assigned during the semester on the following Saturdays: _See table below_ _(Note that you will need to sign up for a term paper topic by September 6.)_ The purpose of these assignments is to learn how to sketch out ideas in writing and organize them in a logical order.

WA	1	2	3	4
due	Sep 11	Oct 9	Oct 30	Nov 13

ACTIVITY	%	POLICIES AND REMARKS
Writing Assignment 5 (Term Paper)	18	Due Saturday, December 4. The paper will be an expository paper on a mathematical topic, and will be at least 2000 words, not including diagrams and references. Paper must contain a significant mathematical content.
Final Exam	22	The exam is comprehensive. ▪ Section 902: Friday, Dec 10, 12:30-2:30 ▪ Section 905: Friday, Dec 10, 3:00-5:00
Quiz	8	Quizzes will be administrated on the following Tuesdays: _See table below_ Each in class quiz will cover material previously taught in class. Review class notes before the quiz making sure you know all definitions and proofs and can solve the problems done in class. One lowest quiz grade will be dropped at the end.

Quiz	1	2	3	4	5	6	7	8	9	10
Date	Sep 7	Sep 14	Sep 21	Sep 28	Oct 12	Oct 19	Oct 26	Nov 2	Nov 16	Nov 25

ACTIVITY	%	POLICIES AND REMARKS
Attendance and participation		Attendance is important. Attendance and participation may also count to 3 extra points added to the final grade. Attendance and participation will only be used to help a student's grade, and it will be determined by judgment of the instructor. If class attendance and participation are insufficient, the final grade will be calculated without.

- **Grading Scale**

Range	Grade
[90, 100]	A
[80, 90)	B
[70, 80)	C
[60, 70)	D
[0,60)	F

NOTE: Since this is a W course, no student can pass the course without a passing grade on the writing portion (see table below). Specifically, if you get less than 60% on the writing portion, you will get an F for the course no matter what your performance on the rest of the course material. If you get between 60% and 70% on the writing portion, you will get no better than D for the course. Otherwise, your grade is as shown in the above table.

Writing Portion Ingredients	
Homework (only problems labeled by "*")	20%
Writing Assignments 1,2,3	25%
Writing Assignment 5 (Term Paper)	55%

Late Work

Late work will NOT be accepted unless you have a university approved reason and contact me within two business days of the missed assignment.

Appeal Policy

Students have one week upon the return of individual grades to notify the instructor of any inaccuracies in their graded work. Students should bring all grade disputes to their instructor in an individual Zoom meeting. Due to FERPA privacy issues, grade disputes will not be discussed over email or in the classroom.

Working with Friends

Working together on homework is fine and encouraged, but each of you **must write up your own solutions in your own words, notation and/or symbols and write the names of your collaborators at the top left corner of your homework.** Copying a solution from a source and referencing the source is still considered a violation of academic integrity because you are submitting work for a grade that is not your own work. It is NOT permissible to discuss any aspect of any quiz, test or examination until ALL students have completed it. The penalties for violating this policy will range from an F on an assignment or test, to failing in the course.

Attendance

Attendance is essential to complete this course successfully.
Excused Absences: University student rules concerning excused and unexcused absences, as well as makeups, can be found at http://student-rules.tamu.edu/rule07. Make-up exams and quizzes or late homework, writing assignments will NOT be allowed unless a University approved reason is given to me

in writing. Notification before the absence is required when possible. Otherwise (e.g., accident, or emergency), you must notify me within two business days of the missed exam, quiz, or assignment to arrange a makeup.

Make-Up Policies

- **Makeups:**   *Exam makeups* will only be allowed due to excused absences and the makeup must be taken as soon as possible after the missed exam. You will need to schedule to make up your exam within 3 business days of the originally scheduled time to allow for grades to be returned in a timely manner. If you know ahead of time you will be absent during an exam, you must notify me in advance. The lowest two quiz scores will be dropped at the end of the semester. That is why *there are generally no make-ups for quizzes, only for exams.*

Tentative Course Schedule

WEEK	TOPIC	TEXTBOOK SECTIONS
1	Language and logic.	§ 1.1
2	Quantified Statements, Negations	§ 1.1
3	Trivial and Vacuous Proofs, Direct Proofs, Disproving Statements	§1.2, 2.1
4	Indirect Proofs, Existence and Uniqueness Proofs.	§ 2.2
5	Induction and Strong Induction. The language of sets.	§ 3.1-3.2 § 4.1
6	Subsets. Operations on sets, unions, and intersections. Exam 1.	§ 4.1-4.2
7	Power set. Cartesian product. Proofs involving sets.	§ 4.2
8	Proofs involving sets (continued). Arbitrary unions and intersections. Functions: Definitions and basic properties.	§ 4.2, 4.3, 5.1
9	Image of function. Composition of functions. Surjective functions and Injective functions.	§ 5.2, 5.3
10	Surjective and Injective functions (continued). Invertible functions.	§ 5.4
11	Functions and sets. Exam 2.	§ 5.5
12	Functions and sets (continued) Division Algorithm and the Well-Ordering Principle. Greatest common divisors and Euclidean Algorithm.	§ 5.5, 6.1 § 6.2
13	Relatively Prime Integers and Fundamental Theorem of Arithmetic. Congruences.	§ 6.3, 6.4
14	Relations. Equivalence relations and partitions.	§ 7.1-7.3
15	Final Exam.	

Other Important Dates: September 3 (last day to add or drop a course), Nov 24 (Reading Day), November 25&26 (no class-- Thanksgiving), November 19 (Q-drop).

Technology Support As much of our learning experience relies on technology, many students can get overwhelmed when something goes wrong, or things get overwhelming. If you're looking for a curation of online learning resources, consider checking out https://keeplearning.tamu.edu/. If your need is specific to a course-related technology issue, consider seeking help from the 24/7 TAMU IT Help Desk. https://it.tamu.edu/help/.

Learning Support

- **The University Writing Center (UWC)** is a resource to help you develop and refine the communication skills vital to success in college and beyond. Currently, you can choose to work with a trained UWC peer consultant via web conference or email. You can schedule an appointment to discuss any kind of writing project. Their consultants can work with you at any stage of your process. To schedule an appointment or to view their handouts, videos, or interactive learning modules, visit `https://writingcenter.tamu.edu/`.

- **Math Learning Center (MLC)** offers various forms of support for Math 300, both online and face-to-face, including drop-in Help Sessions, Tutoring by Appointment, Week-in-Review sessions, and other activities. Additionally, the MLC hosts an archive of Supplemental Material, such as Python tutorial videos and recorded review sessions

Zoom Etiquette

OFFICE HOUR ATTENDEES
When joining office hours via ZOOM, please join with your audio off. Everyone attending office hours will be joining one room, so if you would like to ask a question during office hours, please "raise your hand" and wait to be called on. If you need to speak to me privately, and have not made an individual appointment with me, please let me know through a private CHAT message and I will move you to a breakout room where we can talk one-on-one.

Class Announcements

Class announcements will be posted in Canvas and sent to your university e-mail account (Make sure to check your notification preferences to control how the course updates are sent.) It is your responsibility to check your account and the course page and get familiar with the announcements.

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).
Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

Classroom Facial Mask

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.