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Course title and number	<b>Foundations of Mathematics - MATH 300</b>
Term	<b>Fall 2019</b>
Class times and location	<b>Section 902: Tues-Thurs, 9:35am-10:50am at BLOC 148</b> <b>Section 905: Tues-Thurs, 11:10am-12:25pm at BLOC 148</b>

## INSTRUCTOR INFORMATION

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Name	<b>Oksana Shatalov</b>
e-mail address	<i>shatalov@math.tamu.edu</i> Please include your full name and section number (902/905) in title. Check your TAMU email account daily, because this is where class emails will be sent.
Phone	(979)8621605
Office hours	click <a href="#">here</a>
Web Page	<a href="http://www.math.tamu.edu/~shatalov/">http://www.math.tamu.edu/~shatalov/</a> (Check regularly for announcements and important information, as well as for lecture notes, a course schedule, and other helpful links)

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## COURSE DESCRIPTION AND PREREQUISITES

**Description:** Foundations of mathematics including logic, set theory, combinatorics, and number theory. Prerequisite: MATH 172.

**Prerequisites:** MATH 147, MATH 151 or MATH 171 or equivalent with a grade of C or better.

## 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 reproduce, create, and communicate 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 quantitative and problem-solving skills.
- Be expected to present simple proofs, definitions and statement of theorems.

## TEXTBOOK AND/OR RESOURCE MATERIAL

- **TEXTBOOK:** *Tamara J. Lakins, The Tools of Mathematical Reasoning, American Mathematical Soc., 2016, ISBN 1470428997, 9781470428990. An electronic version of the textbook might be available on the TAMU Library website. For a limited book preview click [here](#).*
- ***This is a W (writing) 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. The instructor will be providing examples and recommendations concerning math writing.

- O 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.
- o 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

### MATERIAL COVERED:

- Most of chapters 1-7. Additional topics may be added. See Tentative Schedule below.

### GRADING POLICIES

First note that this course is an official *Writing Course*. Hence, 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.

	ACTIVITY	%	REMARKS
1.	Test 1	17	TBA (tentatively on week 6)
2.	Test 2	19	TBA (tentatively on week 11)
3.	Homework*	15	It will be assigned approximately once per week (usually due Thursday). It must be turned in 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. Click <a href="#">here</a> to read Homework Submission guidelines.
4.	Term Paper*	19	The paper will be an expository paper on a mathematical topic, and will be at least 2000 words long (approximately 8 pages, typed), not including diagrams and references. A series of <i>Writings Assignments</i> will be assigned during the semester.
5.	Quiz*	10	Approximately once per week (usually on Thursday). Each in class quiz will cover material previously taught in class. Review notes before the quiz. One lowest quiz grade will be dropped at the end.
6.	Final Exam	20	The exam is comprehensive (usually about 50% material of two tests and 50% of new material). Click <a href="#">here</a> for the final examinations schedule.
7.	Attendance and participation		Attendance is important. If you must miss class on days something is to be turned in, please contact me as soon as you know. Attendance and participation may also count up 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.

- **NOTE:** *Since this is a W course, no student can pass the course without a passing grade on the writing portion, which will be calculated as 50% of term paper grade + 40% writing portion of the homework grade + 10% of writing portion of the quiz grade.* 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 below.

- **Grading Scale**

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

### TENTATIVE WEEKLY 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.	

### GENERAL COURSE POLICIES

- **Excused absences:** The University views class attendance as an individual student responsibility. It is essential that students attend class and complete all assignments to succeed in the course. University student rules concerning excused and unexcused absences as well as makeups can be found at <http://student-rules.tamu.edu/rule07>. In particular,
  - o make-up exams and quizzes or late homework will NOT be allowed unless a University approved reason is given to me in writing. Notification before the absence is required when possible. Otherwise, you must notify me within 2 working days of the missed exam, quiz, or assignment to arrange a makeup.
  - o In all cases where an exam/quiz/assignment is missed due to an injury or illness, whether it be more or less than 3 days, I require a doctor's note. I will not accept the "University Explanatory Statement for Absence from Class" form.
  - o Further, an absence due to a non-acute medical service or appointment (such as a regular checkup) is not an excused absence. Providing a fake or falsified doctor's note or other falsified documentation is considered academic dishonesty, will be reported to the Aggie Honor Council, and will result in an F\* in the course.

- **Make-up** exams will only be allowed provided the above guidelines are met. You will be allowed to make up a missed exam during one of the scheduled makeup times provided by the Math Department. According to Student Rule 7, you are expected to attend the scheduled makeup unless you have a University-approved excuse for missing the makeup time as well. If there are multiple makeup exam times, you must attend the earliest makeup time for which you do not have a University-approved excuse. The list of makeup times will be available at <http://www.math.tamu.edu/courses/makeupexams.html>.
- **Class Announcements, E-Mail Policy and Communications**  
Class announcements will be posted on my homepage. It is your responsibility to check them daily. Some important course announcements might be sent to your TAMU.EDU e-mail account or posted on eCampus. It is your responsibility to check your account and get familiar with the announcements. E-mail (shatalov AT math.tamu.edu) is the preferred way to leave private messages for me. I usually respond within 24 hours. When writing to me, please include your full name and Math 220 and section number. Use your TAMU.EDU e-mail account to send me an e-mail.
- **Grade Complaints**  
Any questions regarding grading/scoring of exams must be made **before** the exam leaves the room or no change in grade will be made. If you need more time to look at an exam and do not want to lose your right of protest, hand it back to me at the end of class, and arrange to come to office hours. *Because of privacy rights, I cannot discuss grades over email or phone.*
- **Electronic Device Policy**  
Please refrain from using electronic devices during class. Texting and playing on your phone or computer distracts not only you, but also those around you. If you would like to use a laptop or iPad during class to take notes with, please ask for permission prior to doing so.
- **ACADEMIC INTEGRITY** "An Aggie does not lie, cheat, steal, or tolerate those who do." Visit <http://aggiehonor.tamu.edu> and follow the rules of the Aggie Honor Code.  
In this course students can discuss homework assignments and solutions. However, it is NOT permissible to copy homework solutions from another student. It is NOT permissible to discuss any aspect of any test/quiz or examination until ALL students have completed the exam. The penalties for violating this policy will range from an F on an assignment or test, to failing in the course.
- **AMERICANS WITH DISABILITIES ACT (ADA)**  
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit <http://disability.tamu.edu/>
- **Copyright Policy:** All printed materials disseminated in class or on the web are protected by Copyright laws. One copy (or download from the web) is allowed for personal use. Multiple copies or sale of any of these materials is strictly prohibited.
- **Title IX and Statement on Limits to Confidentiality:** Texas A&M University and the College of Science are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees — including instructors —

cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

- Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.
- These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service (<https://scs.tamu.edu/>).
- Students and faculty can report non-emergency behavior that causes them to be concerned at <http://tellsomebody.tamu.edu> .

(this text was developed by the College of Liberal Arts and vetted by the Title IX Office and the Office of the General Counsel).