

Introduction to Proofs

Math 3300-001 – Spring 2012

Time: Tuesday, Thursday 5:00 – 6:20 PM

Classroom: Pickard Hall 302

Instructor: Prof. Barbara Shipman (Distinguished Teaching Professor ☺)

Office: Pickard Hall 437

Office Hours: Mon. 9:30 – 11:30 AM, Wed. 1 -- 3 PM, and by appointment

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Website: www.uta.edu/faculty/shipman – go to the Student Center, Math 3300, to view the weekly assignments and schedule. Go to www.uta.edu/faculty/shipman/proof for the online course materials.

Prerequisite: Math 1426 (Calculus I)

Textbook (required): Foundations of Mathematics, by Thomas Q. Sibley.
ISBN: 978-0-470-08501-1

Learning Outcomes: On completion of this course, students should be able to

- think critically about mathematical statements using sound principles of logic,
- communicate mathematical reasoning effectively, both orally and in writing,
- read and understand mathematical writing at the level of the textbook,
- decide whether statements involving the topics of the course are true or false,
- construct correct mathematical arguments to prove their claims about statements on the topics of the course,
- create examples or counter-examples and apply them appropriately to prove or disprove statements about the topics of the course, and
- be confident about the correctness of their mathematical reasoning and proofs.

Course Outline (with chapters from the textbook):

Logic, Language, and Sets – Chapter 1

Strategies of Proof – Chapter 2

Functions – Chapter 3

Relations – Chapter 4

Additional topics on cardinality, algebra, discrete mathematics, and real analysis may be chosen from the remaining chapters of the textbook or from supplementary materials.

Active learning and communication: This course is designed as a “bridge” to higher-level mathematical thinking to equip you with critical reasoning and communication skills for upper-level mathematics courses and for research and teaching in mathematics. An essential component of this bridge is to effectively communicate your reasoning verbally and in writing. During class, you will be discussing your thoughts on mathematical questions with your classmates, and you will be called on frequently to explain your reasoning. You should find the skills gained from this useful in daily activities as well! Spoken participation in Math 3300 satisfies the oral communication component of the undergraduate mathematics major.

Prepared Attendance and Participation: At every class meeting, you will receive an attendance and preparation score. A written class preparation (CP) will be due, as posted on the on-line course schedule. A CP is accepted only in class the day it is due. You are responsible for keeping informed of all announcements made in class, including any updates to the syllabus, and regularly checking the postings on the on-line schedule.

- Every CP must be written neatly in dark writing for clean viewing on the projector.
- Multiple pages of a CP must be STAPLED TOGETHER (no paperclips etc.).
- Write your name, bird mascot, and the due date at the top right of the first page.
- For each part of a CP, write out the full problem or question before solving it.
- Justify your answers to all solutions with clear and complete explanations.
- Include all hypotheses, steps, and justifications in all explanations and proofs.
- Work must be written in clear logical order, in complete sentences, and in clear English with correct punctuation.

The class will be divided into five groups, each with a distinguished bird mascot – check the website for the course to find your group! In class, I will regularly ask that everyone in a particular group hand in their CP's. We will view them (on an opaque projector) for discussion, critique, and feedback, and you may be called on to explain your work. You are encouraged to work with your classmates on the CP's, but each person must write up his or her own solutions. Here is the scoring scheme:

- 2: for attending the entire class period with good participation and class preparation (well-explained answers, clearly-written and complete work on the CP when called upon, and good interaction with peers during class activities)
- 0--1: if you arrive after class has begun, leave at any time during class, give less than full attention to or participate inadequately in class activities (including engaging with any type of electronic device); if your CP is inadequately prepared when you are called upon to explain or submit it (including pages not stapled together, unclear writing, not writing out the full problem before the solution, or not justifying a solution)
- 0: if you miss the class for any reason.

After each CP is discussed in class, you are expected to re-write your solutions to correct any errors and settle any further questions on it during office hours and with your peers.

Reading Mathematics: The CP's will often include reading from the textbook to preview material that will be covered in more detail in class. Study the readings and the examples carefully and critically to be prepared for further discussions on the material in class. The readings will help you gain the essential skill of understanding written mathematics.

Team Homework: Three written homework sets will be given, to be completed in teams of ideally three, as assigned. The due dates are listed below. Mistakes on the homework will be circled or otherwise indicated. Many of these errors will be discussed and corrected in class. To prepare for the exams, re-write every homework problem with all errors corrected and settle any further questions on it during office hours and with your peers. Each homework assignment will receive a score based on completeness, clarity, correctness, neatness, and timely submission. Here are the guidelines for preparing the team papers:

- Each team submits one paper, prepared by the whole team, written neatly in dark writing on the homework handout.
- Each team member must work on every problem individually and with the team.
- Each team member must proofread and verify the final written solutions handed in.

- Each team should meet for at least three hours outside of class to work on the project. On the cover sheet, record meeting dates, times, and members present.
- Each team member must sign below his or her printed name on the cover page. The signature indicates that the team member has worked on each problem with the team and has verified the final written solution.
- Include all hypotheses, steps and justifications in all explanations and proofs.
- Work must be written in clear logical order, in complete sentences, and in clear English with correct punctuation.

For each team homework set, the teams will be formed the day the assignment is given. Teams should set up meeting times and begin working on the homework promptly. Students not present when teams are formed will be placed in teams with each other or will be asked to complete the assignment on their own.

Exams: Three tests and a comprehensive final exam will measure your mastery of the concepts studied in class, on the homework, and in the class preparations. A missed exam cannot be made up. One missed exam or lowest exam score will be replaced by the score on the final exam (if the score on the final is better).

Grading: Your work will be graded on correctness, completeness, and clarity.

Prepared Attendance and Participation:	15%
Team Homework:	15%
Three Tests:	45% (15% each)
Final Exam:	25%

A course average of at least 90% guarantees an A, at least 80% a B, at least 70% a C, and at least 60% a D.

Important dates:

Jan 17	First class
Feb 9	Team Homework 1 due
Feb 16	Test 1
Mar 6	Team Homework 2 due
Mar 10 – 18	Spring Break
Mar 22	Test 2
Mar 30	Last day to drop (automatic W)
Apr 12	Team Homework 3 due
Apr 19	Test 3
May 3	Last class
May 8	Final Exam (Tuesday) 5:30 -- 8 PM

Advice for Succeeding in Introduction to Proofs

1. Attend every class. You will not want to miss out on the dynamic classroom debates and feedback on class preparations and homework. Regular attendance is essential to learning the concepts well and preparing for the exams.

2. Work out all of the class preparations and homework problems with your classmates and on your own. To do well in the class, most students need to spend at least 10 hours per week (and probably more) studying and preparing for class.

3. Come to office hours often to ask questions and check your work.

Note: The Math Clinic does not help with Math 3300.

4. Think about logic and proofs when you are doing basic activities such as walking or eating. You don't need to be sitting down with a pencil and paper to think about a problem.
5. If you cannot put in at least 10 hours per week outside of class or if other activities are interfering with your study time and quality, then change something now so that you will be able to do well. Working with other students will help you use your time more efficiently.
6. Come to the MAA meetings (UT Arlington's math club) every first and third Wednesday of each month at 12 noon in PKH 308 for a free lunch and interesting discussions and activities about mathematics. (The MAA is the Mathematical Association of America.)

Policies of the University of Texas at Arlington:

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Academic Integrity: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. According to the UT System Regents' Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

Student Support Services Available: The University of Texas at Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. These resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals to resources for any reason, students may contact the Maverick Resource Hotline at 817-272-6107 or visit www.uta.edu/resources for more information.

Electronic Communication Policy: The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. **Students are responsible for checking their MavMail regularly.** Information about activating and using MavMail is available at <http://www.uta.edu/oit/email/>. There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

To obtain your NetID or for logon assistance, visit <https://webapps.uta.edu/oit/selfservice/>. If you are unable to resolve your issue from the Self-Service website, contact the Helpdesk at helpdesk@uta.edu.