MATH 3300.010 Introduction to Abstract Mathematics – Spring 2019

Instructor Information

**Instructor:** Dr. Susan Abernathy-Taylor

**Office:** MCS 220i

**Phone:** 325.486.5442

**Office Hours:** MW: 8:30-9:00, 11:30-1:00, 2:30-3:30; TR: 3:15-4:30; F: 8:30-9:00, 11:30-12:30; or by appointment

**Email:** All of the following addresses work. They all go to the same inbox; you need only send an email to one of them.

susan.abernathy@angelo.edu
susan.taylor@angelo.edu
staylor28@angelo.edu

Class Time/Location

TR 2:00-3:15pm in MCS 212

Textbook


Grading System

Your grade in this class will be determined by your performance on three in-class exams and written homework. There is no cumulative final exam.

Exams: 80% (highest two 30%, lowest 20%)

Homework: 20%

Final grades will be based on a standard 10-point grading scale (A is 90+, B is 80-89.99, C is 70-79.99, D is 60-69.99, F is below 60).

Disclaimer

This syllabus is current and accurate as of its posting date, but will not be updated. For the most complete and up-to-date course information, email the instructor.

Attendance

Students are expected to attend every class. Attendance will be taken daily, and excessive absences will be reported to the appropriate university authorities.

Homework

Homework will be assigned at least once a week. Late homework will not be accepted. If you know you will miss class, you may turn in your homework early. Your homework must be neat and legible, and you must show your work to receive credit. Your lowest two homework grades will be dropped.

Tests

There will be three in-class exams. Your highest two test grades will each count for 30% of your overall grade, and your lowest test grade will count for 20% of your overall grade. Tentative exam dates are listed below. In general, calculators will not be allowed during exams.

Test 1: Thursday, February 14 at 2:00pm
Test 2: Tuesday, April 2 at 2:00pm
Test 3: Tuesday, May 7 at 1:00pm
Make-up Policy
If you have a conflict with an exam, you must talk to me about it beforehand if possible. If you miss an exam, you will have the opportunity to make up the exam during the last week of classes (April 29 – May 3). The date and time will be determined later this semester, no later than Friday, April 26.

How to Get Help
This is a rigorous course which will develop your logical thinking skills and introduce you to proof-writing. Developing and improving your ability to write clear, logically sound proofs will take practice and it is assumed that you will need help outside of class. You can get help the following ways:

• **Office Hours:** Ten hours of my week are set aside as office hours, when I will be in or near my office for the specific purpose of helping students. These times are listed on the first page of this syllabus. I am also potentially available at other times by appointment; email me to set up a time if you cannot meet during office hours.

• **Email:** Feel free to email me at any time with questions. I will respond as soon as possible, usually within 24 hours during the week and 48 hours on the weekend.

Student Responsibilities
The student is solely responsible for:

• **Maintaining academic honesty.**

• **Completing each assignment by the specified due date.**

• **Obtaining assignments and other materials for classes missed.**

• **Positively contributing to the classroom environment.** Be courteous; don’t use your phone in class; be on time; don’t disrupt your fellow classmates.

• **Being proactive about their grade in this course.** You are not given a grade in a college course; you EARN your grade. You may want or need a particular grade to graduate, maintain a scholarship, or stay in athletics, for instance. **It is your responsibility to put in as much effort as it takes to earn this grade.** This includes utilizing (as needed) all available study aid options (going to office hours and/or Math Lab, reading outside textbooks, meeting with the instructor, etc.) to resolve any questions or concerns you might have about any aspect of the course.

Student Disability Services
ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA), and subsequent legislation.

The Office of Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student’s responsibility to initiate such a request by contacting:
Dallas Swafford  
Director of Student Disability Services  
Office of Student Affairs  
325-942-2047  
dallas.swafford@angelo.edu

**Title IX at Angelo State University:**

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. Sex discrimination, sexual misconduct, public indecency, interpersonal violence, sexual assault, sexual exploitation, sexual harassment, and stalking are not tolerated at ASU. As a faculty member, I am a Responsible Employee meaning that I will report any allegations I am notified of to the Office of Title IX Compliance in order to connect students with resources and options in addressing the allegations reported. You are encouraged to report any incidents to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator. You may do so by contacting:

**Michelle Boone, J.D.**  
Director of Title IX Compliance/Title IX Coordinator  
Mayer Administration Building, Room 200  
325-942-2022  
michelle.boone@angelo.edu

You may also file a report online 24/7 at www.angelo.edu/incident-form.

If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

The Office of Title IX Compliance also provides accommodations related to pregnancy (such as communicating with your professors regarding medically necessary absences, modifications required because of pregnancy, etc.). If you are pregnant and need assistance or accommodations, please contact the Office of Title IX Compliance utilizing the information above.

For more information about Title IX in general you may visit www.angelo.edu/title-ix.

**Student Absence for Observance of Religious Holy Days**

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. The full details can be found in ASU Operating Policy OP 10.19 Observance of Religious Holy Days.

**Incomplete Grade Policy**

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures for more information.
Student Conduct Policies

- **Academic Integrity**: Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. The College of Science and Engineering adheres to the Statement of Academic Integrity.

- **Plagiarism**: Plagiarism is a serious topic covered in ASU’s Academic Integrity policy in the Student Handbook. Plagiarism is the action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own. Plagiarism is literary theft.

  In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

  Papers are subject to be evaluated for originality via Turnitin. Resources to help you understand this policy better are available at the ASU Writing Center.

- **Copyright Policy**: Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

General Policies Related to this Course

All students are required to follow the policies and procedures presented in these documents:
- Angelo State University Student Handbook
- Angelo State University Catalog

Tentative Schedule

This subject matter listed below is tentative and subject to change. For current information about course topics, please contact the instructor.

- Week 1: Logic and Deduction
- Week 2: Propositional Logic and Truth Tables
- Week 3: Two Column Proofs
- Week 4: Contradiction, Set Theory
- Week 5: Set Theory, Review, Exam 1 (Thursday, February 14)
- Week 6: Power Set, Quantification, Negation
- Week 7: Counterexamples, Proofs using Quantifiers
- Week 8: Functions
- Week 9: Bijections
Week 10: Function Proofs, Inverse functions

Week 11: Function Composition, Review, Exam 2 (Tuesday, April 2)

Week 12: Cardinality

Week 13: Divisibility and Congruence

Week 14: Infinite Sets and Countability

Week 15: Cantor’s Theorem, Collections of Sets, Review

Week 16: Exam 3 (Tuesday, May 7 at 1:00pm)

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Student Learning Outcomes

1. **Students will demonstrate factual knowledge of the mathematical notation and terminology used in this course.** Students will demonstrate the ability to read, interpret, and use the vocabulary and symbolism of propositional calculus, proof methods, set theory, functions, cardinality, and discrete structures.

2. **Students will demonstrate knowledge of fundamental methods of proof and problem solving.** Students will demonstrate the ability to read and comprehend mathematical arguments utilizing direct and indirect proof, case analysis, and mathematical induction.

3. **Students will apply course material along with techniques and procedures covered in this course to prove theorems and solve problems.** Students will use the knowledge gained in this course to determine appropriate methods of proof for specific problems and to develop and write formal mathematical arguments.

4. **Students will develop specific skills, competencies, and thought processes sufficient to support further study or work in this field or related fields.** Students will acquire proficiency in the fundamental concepts of set theory, logic, functions, properties of the real number system, and methods of proof, at a level necessary for more advanced mathematics courses such as linear and abstract algebra, real and complex analysis, and topology.

Course Content

**Textbook:** [http://people.uleth.ca/~dave.morris/books/proofs+concepts.pdf](http://people.uleth.ca/~dave.morris/books/proofs+concepts.pdf)

**Ch. 1, Mathematical Reasoning:** Statements, Compound Statements, Implications, Contrapositive and Converse.

**Ch. 2, Sets:** Sets and Subsets, Combining Sets, Collections of Sets.

**Ch. 3, Functions:** Definition and Basic Properties, Surjective and Injective Functions, Composition and Invertible Functions.

**Ch. 4, Binary Operations and Relations:** Binary Operations, Equivalence Relations.
Ch. 5, The Integers: Axioms and Basic Properties, Induction, The Division Algorithm and Greatest Common Divisors, Primes and Unique Factorization, Congruences, Generalizing a Theorem.

Ch. 6, Infinite Sets: Countable Sets; Uncountable Sets, Cantor’s Theorem, and the Schroeder-Bernstein Theorem; Collections of Sets.


Optional: Portions of Ch. 8 (Polynomials, Unique Factorization, Polynomials over C, R, and Q), results from geometry, basic results from linear algebra, analysis, and numerical analysis.

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i Textbook: http://people.uleth.ca/~dave.morris/books/proofs+concepts.pdf
ii Observance of Religious Holy Days: http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of
iii Grading Procedures: http://www.angelo.edu/content/files/14197-op-1011-grading-procedures
iv Academic Integrity: http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php
v ASU Writing Center: http://www.angelo.edu/dept/writing_center/academic_honesty.php
vl University Catalog: http://www.angelo.edu/catalogs/