Course Information

Course Description
Logic, set operations, equivalence relations, properties of the real number system, cardinality of sets, and related topics, with an emphasis throughout on developing the necessary skills to read and construct formal mathematical arguments.

Prerequisite Courses
Mathematics 2413

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 Delivery**

**Synchronous Remote Sessions**
To maintain academic quality while accommodating social distancing needs this semester, this course will use a split delivery model that combines face-to-face teaching with remote instruction.

The goal is to provide face-to-face instruction to students who want to return to campus, while also allowing students who may need to learn remotely to participate via virtual class sessions.

**How Does It Work?**
Your class will be divided and you will be placed into a smaller group of students to maintain physical distancing requirements in our assigned classroom space.

Your assigned group will receive a schedule of in-person class meetings. This schedule is not flexible. For instance, if you are supposed to attend class on a Monday, you cannot elect to go on Wednesday with another class group instead.

When you are not in the physical class, you will attend live remote sessions at the same time as our scheduled course. You will also be expected to complete coursework via Blackboard. In the event that you miss a class, there will be a recording of the lecture available in the Lessons tab in Blackboard. You will still be counted absent for that class.

Please refer to this Health and Safety web page for updated information about campus guidelines as they relate to the COVID-19 pandemic.
Required Texts and Materials

*Proofs and Concepts* by Dave Witte Morris and Joy Morris. This textbook is available for free as a PDF. It may be downloaded from my Blackboard page.

Technology Requirements

Access to exams, quizzes, and homework will be through Blackboard. You will need to scan or photograph any written assignments and submit them through Blackboard. So you will necessarily need a computer, iPad or phone with the above capability. A printer would undoubtedly make your life easier, but it is not required.

If you miss a class, you may either stream it live or watch the lecture at a later time. Both the streaming and recording will be done using Collaborate.

Communication

I will do my best to respond to email and/or telephone messages within 24 hours during working hours Monday through Friday. Weekend messages may not be returned until Monday.

**Written communication via email:** All private communication will be done exclusively through your ASU email address. Check frequently for announcements and policy changes. In your emails to faculty, include the course name and in your subject line.

**Virtual communication:** Office hours and/or advising may be done with the assistance of the telephone, and either Zoom or Collaborate (the choice will depend on which seems to work best). I will make sure you have clear instruction as to how to be connected. If you would like to visit in person, you must make an appointment.

Grading

Evaluation and Grades

The grade will be determined using three in-person exams. Each exam will be worth up to 100 points. Additionally, the adjusted homework average for a particular exam period will be added as bonus points to that exam.

The final exam will affect your grade in the following way: if you score less than 60% on the final, your quiz average will be reduced by a letter grade. If you score a 90% or above on the final, your grade will improve by a letter grade.
Grading System
Course grades will be dependent upon completing course requirements and meeting the student learning outcomes.

The following grading scale is in use for this course:
- A = 90 or more points
- B = 80-89 points
- C = 70-79 points
- D = 60-69 points
- F = 0-59 points

Assignment and Activity Descriptions
All assignments will be submitted through Blackboard. Pay close attention to any deadlines and instructions. Late submissions will generally not be accepted.

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

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 university’s Statement of Academic Integrity.

Accommodations for Students with Disabilities
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.
Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student’s responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the Student Disability Services website. The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford  
Director of Student Disability Services  
Office of Student Affairs  
325-942-2047  
dallas.swafford@angelo.edu  
Houston Harte University Center, Room 112

**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.

**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. Resources to help you understand this policy better are available at the ASU Writing Center.

**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. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day for more information.
**Title IX at Angelo State University**

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Miller, J.D.
Special Assistant to the President and Title IX Coordinator
Mayer Administration Building, Room 210
325-486-6357
michelle.boone@angelo.edu

You may also file a report online24/7.

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.

For more information, visit the Title IX website.12

**Required Use of Masks/Facial Coverings by Students**

As a member of the Texas Tech University System, Angelo State University has adopted the mandatory Facial Covering Policy13 to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are required to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability. For the safety of everyone, any student not appropriately wearing a mask/facial covering will be asked to leave the classroom immediately. The student will be responsible to make up any
missed class content or work. Continued non-compliance with the Texas Tech University System Policy may result in disciplinary action through the Office of Student Conduct.

Modifications to the Syllabus
This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.

Course Schedule
The following is a tentative outline of the material to be covered. I have included the designated test date for each topic. I reserve the right to change the material and/or sequence.

Topics by week

1) What is Logic? Truth Tables
2) Tautologies and Contradictions, Logical Equivalence, Deductions
3) Two-Column Proofs
4) Sets
5) First-Order Logic Test 1 (2/26)
6) Quantifier Proofs
7) Divisibility and Congruence
8) Functions
9) Functions and Cardinality
10) Cardinality Test 2 (3/31)
11) Induction
12) Application of Induction to Various Branches of Mathematics
13) Equivalence Relations
14) Misc. Topics Test 3 (4/30)
15) Review
16) Final Exam

1 https://angelo.blackboard.com/
2 https://www.angelo.edu/covid-19/returning-to-campus/health-and-safety.php
3 https://www.angelo.edu/current-students/student-handbook/
4 https://www.angelo.edu/academics/catalog/
5 https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=96
6 https://www.angelo.edu/current-students/disability-services/