Math 3324: Applied Math for Engineering Course Syllabus

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

Contact Information

Instructor: Dr. Dennis Hall

Office: MCS 220J

Office Hours:  
- Monday: 9-10 and 11:50-1:00
- Tuesday: 10:45-12:30
- Wednesday: 11:50-1:00
- Thursday: 10:45-12:30
- Friday: 9-10 and 11:50-1:00

...or just email me a time that works, and I can probably meet you then!

E-mail: dennis.hall@angelo.edu

Phone: 325-486-5426

Course Information

Course Description: Application of mathematical principles to the analysis of engineering problems using linear algebra and ordinary differential equations (ODE’s). Topics include: mathematical modeling of engineering problems; separable ODE’s; first-, second-, and higher-order linear constant coefficient ODE’s; characteristic equation of an ODE; non-homogeneous equations; matrix addition and multiplication; solution of a linear system of equations; rank, determinant, and inverse of a matrix; eigenvalues and eigenvectors; solution to system of ODE’s by diagonalization; Fourier transforms. This course also introduces the use of scientific computing for the solution of differential equations and linear algebra problems.

Course Content: The following chapters including the sections listed will be covered, depending on time.

1. **First-Order Differential Equations.** Differential Equations and Mathematical Models; Integrals as General and Particular Solutions; Slope Fields and Solution Curves; Separable Equations and Applications; Linear First-Order Equations.


3. **Linear Systems and Matrices.** Introduction to Linear Systems; Matrices and Gaussian Elimination; Reduced Row-Echelon Matrices; Matrix Operations; Inverses of Matrices; Determinants.

4. **Vector Spaces.** The Vector Space $\mathbb{R}^3$; The Vector Space $\mathbb{R}^n$ and Subspaces; Linear Combinations and Independence of Vectors; Bases and Dimension for Vector Spaces; Row and Column Spaces.

5. **Higher-Order Linear Differential Equations.** Introduction: Second-Order Linear Equations; Homogeneous Equations with Constant Coefficients; Mechanical Vibrations.

6. **Eigenvalues and Eigenvectors.** Introduction to Eigenvalues; Diagonalization of Matrices.

7. **Linear Systems of Differential Equations.** First-Order Systems and Applications; Matrices and Linear Systems; The Eigenvalue Method for Linear Systems.

Course Evaluation

Your grade for this course will be determined by your performance on tests, homework, quizzes, and a final exam. Final grades will be based on a standard 10-point grading scale.

**Exams (80%):** There will be 3 in-class tests during the semester. If you do not need a makeup test, then the lowest of these tests will count 16% of your final grade, while the two highest will each count 32%. If you require a makeup test, then the makeup test will count 16% of your final grade, while the other two tests will each count 32%, regardless of which test is higher or lower. You must attempt to schedule a makeup test with me within 24 hours of any missed test in order to receive a makeup test. No student will receive more than one makeup test: any missed tests after the first will receive a grade of zero.

**Project (20%):** You will be required to submit a modeling project and to present a poster on Monday, May 4 from 10:30-12:30. More details about the project will be given in class. The grade for the project will be determined by the rubric that will be handed out before the project due date.

**Homework (Bonus):** Homework assignments will be given throughout the semester. These assignments will count for bonus points on your tests. No late homework will 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 to 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.

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 Boone, J.D.
Director of Title IX Compliance/Title IX Coordinator
Mayer Administration Building, Room 210
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.

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

Student Learning Outcomes

The students will demonstrate factual knowledge including the mathematical notation and terminology used in this course. Students will read, interpret, and use the vocabulary, symbolism, and basic definitions used in Finite Mathematics I including set theory, inequalities, linear and quadratic equations, number systems, polynomials, exponents, logarithms, matrices, probability, and mathematics finance.

The students will describe the fundamental principles arising from the mathematical ideas associated to business applications. Students will identify and apply the laws and formulas that result directly from the definitions; for example, the properties associated with probability models and probability experiments, the properties of exponents, logarithms, equations, and the formulas associated with the mathematics of finance.

The students will apply the course material along with techniques and procedures covered in this course to solve business related problems. Students will use the facts, formulas, and the techniques learned in this course to solve basic business problems. This includes applying probability models to business problems; solving annuity and interest problems; analyzing and interpreting graphs; converting logarithmic equations to exponential equations and vice-versa; using lines and their properties; performing matrix operations; graphing various function types; and employing the use of calculators and/or computers.

The 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 a level of proficiency in the fundamental concepts and applications necessary for areas requiring Finite Mathematics I as a prerequisite. These areas might include business, marketing, finance, computer science, nursing, and the social sciences, as well as mathematics.
Course Schedule

**Weekly Schedule**

Below is a tentative schedule, but it is likely to change throughout the semester.

Week 1: Sections 1.1 and 1.2
Week 2: Sections 1.3, 1.4, and 1.5
Week 3: Sections 2.1 and 2.2
Week 4: Sections 2.3, 2.4, and 2.6
Week 5: Test 1 and Sections 3.1 and 3.2
Week 6: Sections 3.3 and 3.4
Week 7: Sections 3.5, 3.6, 4.1
Week 8: Sections 4.2, 4.3, 4.4
Week 9: Section 4.5 and Test 2
Week 10: Sections 5.1, 5.3
Week 11: Sections 5.4, 6.1
Week 12: Section 6.2, 7.1
Week 13: Sections 7.2 and 7.3
Week 14: Test 3
Week 15: Working on Posters
Week 16: Poster Presentations
How to Get Help

Angelo State University offers many free ways to get help in your classes, especially in math.

1. **Math Lab:** A tutoring lab staffed by undergraduate tutors. This lab has computers and empty tables where you can study or work on homework, and ask questions as needed. You can also just stop by to ask specific questions. No appointment is needed.
   
   Location: 3rd floor of the library, Room C302
   
   Hours: Monday-Thursday 9am-8pm; Friday 9am-Noon; Sunday 4pm-8pm
   
   Contact: [https://www.angelo.edu/dept/freshman-college/math-lab.php](https://www.angelo.edu/dept/freshman-college/math-lab.php) or 325-486-6369

2. **Upswing:** An online tutoring service paid for by ASU. Schedule a session, or connect instantly with one-on-one tutors using a virtual whiteboard, audio, and (optionally) video.
   
   Location: [https://angelo.upswing.io/](https://angelo.upswing.io/) and click “New User”
   
   Hours: 24/7 or by appointment

3. **Office Hours:** I have nine hours every week that are set aside to work with students. These hours are on the first page of this syllabus, and no appointment is necessary during these times. I am also available at other times by appointment. Speak with me after class or email me at [dennis.hall@angelo.edu](mailto:dennis.hall@angelo.edu) to set up a time.

4. **Email:** Almost every day, I am available via email at [dennis.hall@angelo.edu](mailto:dennis.hall@angelo.edu). Feel free to email me anytime with questions: I’ll respond as soon as possible.

5. **Private Tutors:** Though not free, the mathematics department also maintains a list of students that are interested in private tutoring. Stop by the math department office for more information.

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i [https://www.angelo.edu/student-handbook/](https://www.angelo.edu/student-handbook/)

ii [https://www.angelo.edu/catalogs/](https://www.angelo.edu/catalogs/)

iii [https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php](https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php)

iv [https://www.angelo.edu/services/disability-services/](https://www.angelo.edu/services/disability-services/)

v [https://www.angelo.edu/content/files/14197-op-1011-grading-procedures](https://www.angelo.edu/content/files/14197-op-1011-grading-procedures)

vi [https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of](https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of)