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: M&W: 12:50-2:00; T&Th: 10:45-12:30, W: 10:50-12:00, F: 12:00-2:00; and by appointment
E-mail: dennis.hall@angelo.edu
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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.

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**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 (75%):** 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 15% of your final grade, while the two highest will each count 30%. If you require a makeup test, then the makeup test will count 15% of your final grade, while the other two tests will each count 30%, 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 (25%):** You will be required to submit a modeling project and to present a poster on Monday, December 9. 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.

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**Other 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.
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 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:

Ms. Dallas A. Swafford
Director of Student Disability Services
325-942-2047
Dallas.swafford@angelo.edu
Houston Harte University Center

Title IX:
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. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex. You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Boone, J.D. You may submit reports in the following manner:

Online: www.angelo.edu/incident-form
Face to Face: Mayer Administration Building, Room 210
Phone: 325-942-2022
E-mail: michelle.boone@angelo.edu

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to
someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State’s policy please visit: www.angelo.edu/title-ix.

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

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.

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.

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

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
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
Important Dates

August 26: First day of class
September 2: Labor Day Holiday
October 31: Last day to drop a class
November 27-29: No Class (Thanksgiving)
December 9: Poster Presentations 10:30-12:30

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 to set up a time.

4. **Email:** Almost every day, I am available via email at 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.