

**THE UNIVERSITY OF TEXAS AT EL PASO**  
**COLLEGE OF SCIENCE**  
**DEPARTMENT OF MATH**

Course #: Math 2326 (CRN: 20660)  
Course Title: Differential Equations  
Credit Hrs: 3  
Term: Spring 2024  
Course Meetings & Location: TR 10:30AM – 11:50AM LART 304  
Prerequisite Courses: Math 1312 with a grade of at least C.

Instructor: Francisco Avila  
Office Location: Library 521  
Contact Info: 747-8752  
E-mail address: favila2@utep.edu  
Emergency Contact: (915) 747-5761 (Math Department)  
Office Hrs: MW 3:00PM – 4:20PM or by appointment

Textbook(s), Materials: Required: Blanchard, Devaney and Hall, *Differential Equations*, Fourth Edition  
Required: Scientific Calculator

Course Objectives (Learning Outcomes): **Contents:** This course is devoted to the study of ordinary differential equations in the context of dynamical systems. Modeling, separation of variables, qualitative and numerical methods, equilibria and bifurcations, linear systems, driven oscillations, real and complex solutions.

**Objectives:** To introduce topics to practice with strong emphasis on applications. The goals are to learn basic concepts, theory, methods and applications of ordinary differential equations with emphasis on modeling and dynamics.

Course Activities/Assignments: Homework and Quizzes will be assigned on **WeBWork**. **WeBWork** is an open-source online homework system for math and sciences courses. Instructions to use this platform will be posted on Blackboard. You must have reliable internet in order to use it. Unannounced quizzes may be administered in the classroom.

Assessment of Course Objectives: There will be 2 partial exams and one comprehensive final administered in the classroom. **NO EXTRA CREDIT OR CURVES ON EXAMS. NO REPLACEMENT OF EXAM WITH FINAL EXAM.**

Grading Policy: Your grade will be calculated as follows:

Homework	10%
Quizzes	10%
Exam 1	25%
Exam 2	25%
Comprehensive Final	30%

The grading scale for this course is:

90 – 100 = A

80 – 89 = B

70 – 79 = C

60 – 69 = D

0 – 59 = F.

Drop Policy: **The Drop Date for this semester is March 28 before 5:00 PM Mountain Time. No drops will be approved after this date or time.**

Students who decide to drop the course must process a drop form by emailing your miners email account to [records@utep.edu](mailto:records@utep.edu).

Please note that the College of Science will remain aligned with the university and will not approve any drop requests after that date.

Make-up Policy: No makeup exams will be allowed except with proper documentation, i.e. doctor's note, hospital's note, or UTEP excused absence document.

Attendance Policy: Students must attend every class. Students are to arrive on time to class. It is the student's responsibility to find out what assignment must be made up when they are absent.

Civility Statement: Calculators may not be shared during quizzes and exams. Please do not use cell phones, pagers, iPods, MP3 players, blue tooth devices, etc. during class. Cell phones and pagers should be set to silent or vibrate, and any calls should be taken outside of class. Please do not wear headsets or blue tooth devices during class. Please don't talk in class. Cell phone calculators may not be used on quizzes or exams. Active participation in class is expected, teamwork in class will be implemented.

Academic Integrity Policy: The University policy is that all suspected cases or acts of alleged academic dishonesty must be referred to the Dean of Students for investigation and appropriate disposition. Any student who commits an act of academic dishonesty is subject to discipline. Academic 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 an unfair advantage to a student or the attempt to commit such acts.

Each student is responsible for notice of and compliance with the Regents' Rules and Regulations provisions, which are available for inspection electronically at

<https://www.utsystem.edu/offices/board-regents/regents-rules-and-regulations>.

All students are expected and required to obey the law, comply with the Regents' Rules and Regulations, with System and University rules, with directives issued by an administrative official during their official duties, and observe appropriate standards of conduct for the University. A student who enrolls at the University must conduct themselves in a manner compatible with the University's function as an educational institution. Any student who engages in conduct that Regents' Rules prohibit and Regulations, U. T. System or University rules, specific instructions issued by an administrative official or by federal, state, or local laws is subject to discipline, whether such conduct takes place on or off campus or whether civil or criminal penalties are also imposed for such behavior.

Course Etiquette Policy: All correspondence with your instructor, TA, and other students should be conducted appropriately and professionally. Please be considerate of your tone and word choice when working on a post.

Military Statement: If you are a military student with the potential of being called to military service and /or training during the course of the semester, you must contact me as soon as possible **before** you leave.

Accommodation Policy: The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services, and activities with documented disabilities to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship for the University. Students requesting accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, email them at [cass@utep.edu](mailto:cass@utep.edu), or apply for accommodations online via the CASS portal.

*COVID-19 Precautions:*

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you feel unwell, please let me know as soon as possible so we can work on appropriate accommodations. If you have tested positive for COVID-19, report your results to [covidaction@utep.edu](mailto:covidaction@utep.edu) so that the Dean of Students Office can support you and help communicate with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Centers for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks indoors in groups of people. The best way that Miners can care for Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit [epstrong.org](http://epstrong.org).

Please contact me immediately if you fall ill during the semester so we can formulate a strategy to help you get caught up as soon as possible.

Copyright Statement: *Course Materials*

All materials used in this course are protected by copyright law. The course materials are only for students currently enrolled in this course and only for this course. They may not be further disseminated.

### *Class Recordings*

A recording of class sessions must be kept and stored by UTEP by FERPA and UTEP policies. Using such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP's acceptable-use policy. Your instructor will not share recordings of your class activities outside of course participants, including your fellow students, teaching assistants, graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. You may not share recordings outside of this course. Doing so may result in disciplinary action.

**Video or pictures of lectures must have written consent from the instructor and student(s).**

#### Academic and Technology Resources:

- **[Help Desk](#)**: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus, Academic Resources.
- **[UTEP Library](#)**: Access a wide range of resources, including online, full-text access to thousands of journals and eBooks, reference service, and librarian assistance for enrolled students.
- **[Math Tutoring Center \(MaRCS\)](#)**: Ask a tutor for help and explore other available math resources.

#### Individual Resources:

- **[Military Student Success Center](#)**: Assists personnel in any branch of service to reach their educational goals.
- **[Center for Accommodations and Support Services](#)**: Assists students with ADA-related accommodations for coursework, housing, and internships.
- **[Counseling and Psychological Services](#)**: Provides various counseling services, including individual, couples, and group sessions, as well as career and disability assessments.

Course Schedule:  
**(Subject to Change)**

Day	Section	Description
Week 1	1.1	Modeling Via Differential Equations
Week 1	1.2	Analytic Technique: Separation of Variables
Week 2	1.3	Qualitative Technique: Slope Fields
Week 2	1.4	Numerical Technique: Euler's Method
Week 3	1.5	Existence and Uniqueness of Solutions
Week 3	1.6	Equilibria and the Phase Line
Week 3	1.7	Bifurcations
Week 4	1.8	Linear Equations
Week 4	1.9	Integrating Factors for Linear Equations
Week 5	2.1	Modeling via Systems
Week 5	2.2	The Geometry of Systems
Week 6	2.3	The Damped Harmonic Oscillator
Week 6	2.4	Additional Analytic Methods for Special Systems
Week 6	Review	
Week 7	Exam1	
Week 7	3.1	Properties of Linear Systems and the Linearity Principle
Week 8	3.2	Straight-Line Solutions
Week 8	3.3	Phase Portraits for Linear Systems with Real Eigenvalues
Week 9	3.4	Complex Eigenvalues
Week 9	3.5	Special Cases: Repeated and Zero Eigenvalues
Week 10	3.6	Second-Order Linear Equations
Week 10	3.7	The Trace-Determinant Plane
Week 11	3.7	The Trace-Determinant Plane
Week 11	5.1 – 5.2	Equilibrium Point Analysis
Week 12	Review	
Week 12	Exam 2	
Week 13	6.1	Laplace Transforms (Part I)
Week 13	6.2	Laplace Transforms (Part II)
Week 14	6.3	Laplace Transforms (Part III)
05/09/24	Final Exam	Thursday, May 9 <sup>th</sup> 10:00pm – 12:45pm