



Texas A&M University-San Antonio
Department of Computational, Engineering, and Mathematical Sciences
MATH 3320, Section 001, Differential Equations, S24

Instructor: Prof. Burak Aksoylu

Class Hours: TR 9:30-10:45 AM

Classroom: HALL 321

Office Hours: TR 11:00 AM-12:30 PM or by appointment.

Credit Hours: 3

Office Phone: (210) 784-2428

Office: HALL 314W

E-mail: baksoylu@tamsu.edu

Course Description and Materials

Catalog Description: The ordinary differential equations of physics, chemistry, and engineering; methods for their solutions and the properties of their solution.

Prerequisite: MATH 2314, MATH 2114 with a grade of "C" or higher. You are expected to be familiar with single and multi-variable calculus, and linear algebra. You should be able to work out second derivatives of all elementary functions, to use derivatives in real world problems interpreting the derivative as rate of change, to interpret integral as area and total change, to evaluate the integrals using various integration techniques, to have a basic understanding about differential equations, to apply these concepts in multi-variable situations, to understand the concept of linearity and eigenvalues and eigenvectors of matrices.

Required Textbook: Elementary Differential Equations and Boundary Value Problems, 11th Edition, by William E. Boyce, Richard C. DiPrima, and Douglas B. Meade. E-text will be used through WileyPLUS Platform. Purchasing a hard copy of the textbook is optional.

Student Learning Objectives: There are two main course goals: to prepare you mathematically for your major courses and to develop your critical thinking, communication, technology, and teamwork skills. Your objectives by the end of this course are that you will be able to:

- Understand and apply the concept of differential of equations in real-life situations
- Solve certain types of differential equations and systems using analytic methods.
- Analyze a differential equation or system qualitatively without necessarily solving.
- Explain mathematical solutions in a coherent way so that your solutions are understandable to a reader who has not solved the problem herself/himself.

List of Topics: Topics to be covered include but are not limited to the following (20 sections):

Chapter 1 Introduction (Sections 1.1-1.3)

1.1 Some Basic Mathematical Models; Direction Fields

1.2 Solutions of Some Differential Equations

1.3 Classification of Differential Equations

Chapter 2 First Order Differential Equations (Sections 2.1-2.8)

- 2.1 Linear Equations; Method of Integrating Factors
- 2.2 Separable Equations
- 2.3 Modeling with First Order Equations
- 2.4 Differences Between Linear and Nonlinear Equations
- 2.5 Autonomous Equations and Population Dynamics
- 2.6 Exact Equations and Integrating Factors
- 2.7 Numerical Approximations: Euler's Method
- 2.8 The Existence and Uniqueness Theorem

Chapter 3 Second Order Linear Equations (Sections 3.1-3.6)

- 3.1 Homogeneous Equations with Constant Coefficients
- 3.2 Fundamental Solutions of Linear Homogeneous Equations; The Wronskian
- 3.3 Complex Roots of the Characteristic Equation
- 3.4 Repeated Roots; Reduction of Order
- 3.5 Nonhomogeneous Equations; Method of Undetermined Coefficients
- 3.6 Variation of Parameters

Chapter 6 The Laplace Transform (Sections 6.1-6.3)

- 6.1 Definition of the Laplace Transform
- 6.2 Solution of Initial Value Problems
- 6.3 Step Functions

Active Learning and Inquiry Based Learning: This course implements active learning and inquiry-based learning approaches throughout, and the students are strongly encouraged to preview the teaching materials and be aware of many class participation and self/peer study activities.

Course Expectations and Requirements

Class Attendance: Students are expected to attend classes as scheduled and be prepared to participate in discussions, in-class exercises, quizzes and problem presentation. Class attendance during class. If we meet at Zoom, then attendance is taken in the Zoom Chatroom by typing "Hi, Burak Aksoylu is present." You are strongly encouraged to attend all classes. I give out a lot of extra credit for class participation which will be directly added to your score as a bonus.

Midterm Exams: There will be two in-class exams during the semester. In case you miss an exam or find out that you will miss an exam, you should contact me either in person or by e-mail, at least one week in advance of the exam for non-emergency cases or within 24-hrs of the scheduled exam date for emergency cases. Any missed exam counts as a 0 unless the student has a valid documented excuse and contacts me as soon as possible after the excuse for missing the test arises. Examples of valid documented excuses are sickness documented with a doctor's note, death in the family documented with a copy of the death notice, attending university-sponsored events with a Dean's excuse, etc. Minor headaches or attending sports events (without Dean's excuse) are not examples of emergency situations.

Final Exam: In order to pass this class students must take a final exam scheduled during Finals Week. Final exams cannot be rescheduled or missed (for dire and unforeseen medical or family emergencies, students must consult with me).

Homework/Quizzes: Homework and quizzes will be assigned through WileyPLUS. Some problems on the quizzes and exams may be directly from the homework. I strongly encourage you to do the homework regularly. There will be 5 quizzes and your lowest score will be dropped. There will not be make up for Quiz. Quizzes will have two parts: **in-class (80% weight)** and **take home (20% weight)**.

Calculator: A calculator is not necessary in this course and will be not allowed on quizzes and exams. In addition, graphic calculators, cell phones, laptops, iPads, kindles, and any other electronic/mobile devices are absolutely **NOT** allowed during the tests/exams. Once found, your tests/exams would receive a grade of zero.

Grading Policy

The final course grade is calculated as follows:

Attendance/Participation: 5%; Homework: 10%; Quizzes: 20%; Exams: 40% (20% each); Final Exam: 25%.

A = 90~100% B = 80~89.9% C = 70~79.9% D = 60~69.9% F = 0~59.9%

Online Resources:

Drawing direction fields: <https://aeb019.hosted.uark.edu/pplane.html>

Khan Academy: <https://www.khanacademy.org/math/differential-equations>

Tips for Studying: The main characteristic of the mathematic course is the fact that all the topics are linked to each other, so that every newly introduced concept is built upon old ones. The most common reason for difficulty in this course is failure to study consistently. You must study this course consistently. You are developing a skill; **no one would expect to become good at tennis if s/he only played once a month**. In order to succeed, the student should do all the following:

- Read the material in the text before class. Attend the lecture and take notes. During the lectures relevant examples are discussed.
- Practice solving many problems in the e-text even not assigned ones.
- Do *all* assigned homework and attempt *all* questions.
- Seek help. Visit your instructor during office hours. Ask about poorly understood points as soon as possible.
- Exam Preparation. Redo all the homework, quiz problems and questions solved in the class.
- Work neatly. Make sure you show all work. Answers/solutions given with no explanation may receive little or no credit! During the exams, if you have time, check your work.
- Keep track of your grade on BlackBoard or WileyPLUS.

NOTE: The instructor reserves the right to modify/update the information of this syllabus as appropriate.

IMPORTANT POLICIES AND RESOURCES

Academic Accommodations for Persons with Disabilities: Texas A&M University-San Antonio is committed to providing all students with reasonable access to learning opportunities and accommodations in accordance with The Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Support Services in the Central Academic Building, Suite 210, or at (210) 784-1335 or visit <https://www.tamusa.edu/index.html> or email us at dss@tamusa.edu. Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability-related needs with Disability Support Services and their instructors as soon as possible.

Academic Learning Center: The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University-San Antonio. Students wishing to work with a tutor can make appointments through the Brainfuse online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu, calling (210) 784-1307, or visiting the Central Academic Building, room 202.

Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and/or negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment call 210-784-1331 or visit Madla 120. All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services.

Crisis support is available 24/7 by calling the SCC at 210-784-1331 (after-hours select option '2'). For more information and self-help resources, please visit www.tamusa.edu/studentcounseling

Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>.

More information about Emergency Operations Plan and the Emergency Action Plan can be found here: <https://www.tamusa.edu/about-us/campus-information/safety/university-police-department/documents/emergency-operations-plan.pdf> and <https://www.tamusa.edu/about-us/campus-information/safety/university-police-department/documents/emergency-action-plan.pdf>

Download the SafeZone App for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended the first week of class. Any student receiving federal financial aid who does not attend the first week of class will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Writing, Language, and Digital Composing Center: The Writing, Language, and Digital Composing Center supports graduate and undergraduate students in all three colleges as well as faculty and staff. Tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. Students can schedule appointments through JagWire under the Student Services tab. Click on “Writing, Language, and Digital Composing Center” to make your appointment. The Center offers face-to-face, synchronous online, and asynchronous digital appointments. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our website at <https://bit.ly/WLDCCenter>.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students (DOS@tamusa.edu) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to provide any resources they may possess.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to communicate, in advance if possible, and special circumstances (e.g., upcoming deployment, drill requirements, disability accommodations). You are also encouraged to visit the Patriots’ Casa in-person room 202, or to contact the Office of Military Affairs with any questions at military.va@tamusa.edu or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop does not affect the student’s GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as “F” grades and will impact the student’s GPA.

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equality of opportunity and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality and the uniqueness of the individual within our state, nation, and world. All decisions and actions involving students and employees should be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, gender identity, gender expression, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the appropriate offices within their respective units.

Texas A&M University-San Antonio faculty are committed to providing a safe learning environment for all students and for the university as a whole. If you have experienced any form of sex- or gender-based discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking, know that help and support are available. A&M-San Antonio's Title IX Coordinator can support those impacted by such conduct in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the Title IX Coordinator. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty member must share that information with the university's Title IX Coordinator (titleix@tamusa.edu, 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide reasonable accommodations to pregnant students that would be provided to a student with a temporary medical condition and that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the Title IX Coordinator with any questions or concerns related to their status (titleix@tamusa.edu; 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

Students' Rights

1. A student shall have the right to participate in a free exchange of ideas, and there shall be no University rule or administrative rule that in any way abridges the rights of freedom of speech, expression, petition and peaceful assembly as set forth in the U.S. Constitution.
2. Each student shall have the right to participate in all areas and activities of the University, free from any form of discrimination, including harassment, on the basis of race, color, national or

ethnic origin, religion, sex, disability, age, sexual orientation, or veteran status in accordance with applicable federal and state laws.

3. A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
4. Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

Students' Responsibilities

1. A student has the responsibility to respect the rights and property of others, including other students, the faculty and administration.
2. A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, [Student Code of Conduct](#), on our website, University Catalog and to comply with them, as well as federal, state, and local laws.
3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
4. A student has the responsibility to recognize the University's obligation to provide an environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notification.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

Students are expected to exhibit a high level of honesty and integrity in their pursuit of higher education. Students engaging in an act that violates the standards of academic integrity will find themselves facing academic and/or disciplinary sanctions. Academic misconduct is any act, or attempt, which gives an unfair advantage to the student. Additionally, any behavior specifically prohibited by a faculty member in the course syllabus or class discussion may be considered as academic misconduct. For more information on academic misconduct policies and procedures please review the [Student Code of Conduct](#).

No Use of Generative AI Permitted

MATH 3340 assumes that all work submitted by students will be generated by the students themselves, working individually or in groups. Students should not have another person/entity do the writing of any portion of an assignment for them, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

NOTE: Guidance for how to cite AI-generators, like ChatGPT, can be found here

<https://apastyle.apa.org/blog/how-to-cite-chatgpt>

Important Dates:

January 16	First day of class
March 11-17	Spring Break – No classes
March 29	Study Day – No classes
April 13	Last day to drop with an automatic "W"
April 20	Last day to drop a course or withdraw from the University
April 29	Last day of classes

April 30 Study Day – No classes

May 1-7 Final exams

The complete academic calendar is available online: <https://www.tamusa.edu/academics/academic-calendar/index.html>