MATH 3320-001 Differential Equations–Spring 2025

Instructor:	Dr. Kun Gou (Associate Professor of Mathematics)
Email:	kgou@tamusa.edu
Web:	https://apps.tamusa.edu/course-information/Profile/Faculty/387?=Kun-Gou
Office:	Classroom Hall 220
Office hours:	Tue & Thu 11am-12:30pm; Thu 3:30-4:30pm
	or by appointment (can also be online office hours using zoom)

REGULAR CLASS MEETING TIME AND LOCATION: Tue & Thu 9:30-10:45pm; Location: Classroom Hall 321

TEXTBOOK: Elementary Differential Equations and Boundary Value Problems, 12th 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.

ONLINE PLATFORM: Homework will be given online at Wileyplus with the web address www.education.wiley.com. Every student needs to register on this website to access homework and the e-textbook. Set up your account first. And then using the access code provided in Blackboard to register
Note: Do not pay it anymore. You have paid by your tuition. Only use university email to register. Use the same name as appearing in your student ID to register.

Introduction video for WileyPlus: https://wileyplus.gallery.video/instructors (This video walks students through the key features in WileyPlus, with tips for making the most of the platform in your class.)

COURSE 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 net 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.

COURSE 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 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)

* * * * * * * * * * * * * * * * * * *

GRADING POLICY: Final grades will be based on two midterm tests, HWs, attendance, and the final. The final will be comprehensive. Ratios are: tests 30%, HW 35%, attendance 5%, and final 30%.

The grading scale is:

total points	$\geqslant 90$	$\geqslant 80$	$\geqslant 70$	$\geqslant 60$	< 60
grade	A	B	C	D	F

CALCULATOR POLICY IN EXAMS: A scientific non-graphing, non-programmable calculator is required and allowed on all exams. No cell phone, laptop, or graphing calculator will be allowed, and online math utilities (e.g., Desmos) are also not allowed. Students are responsible to bring their own scientific calculators. The instructor does not provide scientific calculators. Students can also try to check whether the library has a scientific calculator to borrow.

Midterm test extension policy:
Tests can only be rescheduled for a later date in case of student illness, family issues, attending University events, or other significant cases approved by the instructor. An official document is required for the excuse. Students have to immediately inform the instructor about the circumstances and negotiate the day of the makeup. *Notice to the instructor for make-up after the regular test/final time is not acceptable. Makeup cannot be made 5 weekdays later than the regular test dates.*

* * * * * * * * * * * * * * * * * *

Suggested Learning Strategy:
Be advised that college math learning requires much initiative from the students to not only really remember the principles, but also **understand** the theory, and finally apply it to solve abstract/practical problems independently. So be hard-working to read and understand the class-notes and textbook. If you have a wrong problem in HW, test, or quiz, understand why, and know the right way to solve it. Feel free to talk to your instructors in their office hours, and use the online platform to self-learn if necessary. Solve the problem; don't accumulate it. In summary:

- Review the classnotes regularly;
- Read the textbook to enhance understanding (more detailed materials);
- Finish homework on time. Don't wait to the last minute to do it. Understand why your solutions are wrong and how to find the correct ones;
- Discuss with your instructor or classmates for difficult concepts.
- Only you yourself deeply know if your study is enough or not. Take action to strengthen yourself in learning effect. Aside from the regular class time each week, you should devote at least 6-8 hours weekly to studying on your own.

How to prepare for mid-term exams and the final exam:
- Review all our class notes, and deeply understand the materials before the tests.
- Also try to work out the examples in the notes and compare your answers with the answers in the notes.
- Many test problems will be similar to HW problems. Please understand the HW problems deeply and make sure you can work out the problems correctly without resorting to the help resources.
- You can also work on additional not-graded exercises for practice.
- Check your solution carefully before you write your answer to make sure it is right by your understanding.
- Pay attention to the detail. Follow the requirement of the answer format like how many decimal places are needed.

* * * * * * * * * * * * * * * * * * *

University Email Policy and Course Communications: All correspondence between professors and students needs to occur via **University email accounts**. You need to have Jaguar email account ready and working. If it is not working, contact the help desk at sahelp@tamusa.edu or at 210-784-4357. Students are expected to check the university emails frequently since important announcements and course materials will be sent there.

Civility in the Classroom: Students are expected to be supportive and encouraging to other students to help create a positive learning environment. Students are expected not to use cell phones, laptops, or other electronic devices in class for any non-course related purposes. Please make every effort to avoid situations that require you to leave before the end of class. However, in the event that you must leave class early please inform your instructor in advance.

Academic Dishonesty: Students at Texas A&M University-San Antonio are expected to adhere to the highest standards of academic honesty and integrity. Academic Dishonesty for which a student is subject to penalty includes cheating, plagiarism, fabrication, multiple submission, misrepresentation of academic records, facilitating academic dishonesty, unfair advantage, violating known safety requirements and ethical misconduct. This includes holding other students to the same standards and reporting any incidents of alleged violation of the honesty policy to the instructor involved or, if necessary, to the appropriate academic department head. All students are responsible for being familiar with the Academic Dishonesty Policy which may be found in the Texas A&M University-San Antonio Student Handbook.

Your instructor is sympathetic to the pressures faced by many students (e.g., full time employment, family responsibilities), and will do his/her best to provide you with any assistance you may need to succeed in this course. However, he/she is also committed to awarding grades based on students' honest efforts. Therefore, your instructor will accept no excuses for any form of academic misconduct. All incidents of suspected academic dishonesty will be investigated and pursued to the fullest extent permitted by university policy.

For other important policies and resources, please see below

IMPORTANT POLICIES AND RESOURCES

Academic Accommodations for Individuals 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, Disability Support Services is located in the Central Academic Building, Suite 210. You can also contact us via phone at (210) 784-1335, visit us https://www.tamusa.edu/Disability-Support-Services/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 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. For more information on SCC services visit tamusa.edu/studentcounseling

Crisis support is available 24/7 by calling the SCC at 210-784-1331 (after-hours select option '2').

Additionally, the TELUS Student Support App provides a variety of mental health resources to including support for in the moment distress, an anonymous peer to peer support network, mental health screenings, podcasts, and articles to improve your mental wellbeing.
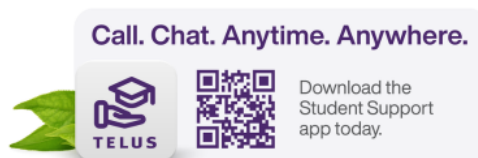
Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update 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/emergency-management/.

Download the SafeZone App (https://safezoneapp.com/) 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://www.tamusa.edu/academics/.

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 submit a CARE referral (https://www.tamusa.edu/university-policies/Student-Rights-and-Responsibilities/file-a-report.html) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to direct you to available resources.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to visit the Office of Military Affairs for any question involving federal or state VA Education Benefits. Visit the

Patriots' Casa building, 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 course 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, equal 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, 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 such reasonable accommodations to pregnant students as would be provided to a student with a temporary medical condition 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, gender identity, gender expression, and pregnancy/parenting 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, <u>Student Code of Conduct</u>, on our website, and University Catalog, and to comply with them, as well as with 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 a safe environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notifications.

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. Conduct that infringes 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 (https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/documents/Student-Handbook-2022-23.pdf) or visit the resources available in the OSRR website (https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/academic-integrity.html).

Broader Use of Generative AI Permitted Within Guidelines

Use of artificial intelligence (AI) tools, including ChatGPT, is permitted in this course for students who wish to use them. To adhere to our scholarly values, students must cite any AI-generated material that informed their work (this includes in-text citations and/or use of quotations, and in your reference list). Using an AI tool to generate content without proper attribution qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

<u>Important Dates:</u>
January 21 Tuesday First class day
January 28 Tuesday Last day to register
February 5 Wednesday Census Date
February 6 Thursday Drop for non-payment
February 24-March 7 Monday-Friday Midterm grading period
March 10-March 15 Monday-Saturday Spring Break
April 18 Friday Study day - No classes
April 21 Monday Last day to drop with an automatic grade of "W"

April 28 Monday Last day to withdraw from the university
May 5 Monday Last day of scheduled classes for weekday classes
May 6 Tuesday Study day - No classes
May 7-May 13 Wednesday-Tuesday Final examinations

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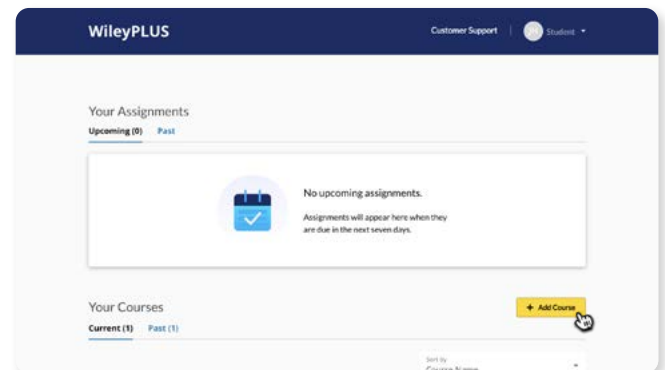
WileyPLUS

How to access your course

1 Log in to WileyPLUS

- Log in at **www.wileyplus.com/go/login**
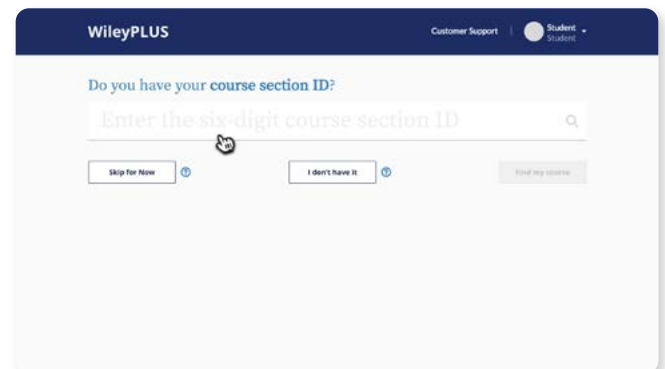- Select **Add Course**

Don't have a WileyPLUS account? Create one at **www.wileyplus.com/go/signup**

2 Find your course

- Enter your **Course Section ID** and select **Find my course**
- Review your course section details, then click **Next**

3 Register and access

- **Already purchased?** Just enter your registration code.
- **Haven't purchased?** Choose a purchase option or start a free trial.
- **Access your course** and start learning!

Go to **www.wileyplus.com/go/wpngsupport** for registration help
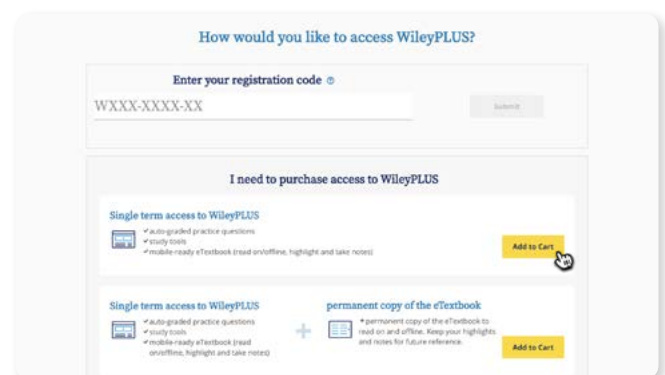
WILEY

Tentative schedule

(subjected to change)

Days	Content
Jan 21 Tue	Introduction to Course. WileyPlus setup Chapter 1 Introduction 1.1 Some Basic Mathematical Models; Direction Fields
23 Thu	1.2 Solutions of Some Differential Equations
28 Tue	1.3 Classification of Differential Equations
30 Thu	Chapter 2 First Order Differential Equations 2.1 Linear Equations; Method of Integrating Factors
Feb 4 Tue	2.2 Separable Equations
6 Thu	2.3 Modeling with First Order Equations
11 Tue	2.4 Differences Between Linear and Nonlinear Equations
13 Thu	2.5 Autonomous Equations and Population Dynamics
18 Tue	2.6 Exact Equations and Integrating Factors
20 Thu	2.7 Numerical Approximations: Euler's Method
25 Tue	2.8 The Existence and Uniqueness Theorem
27 Thu	Chapter 3 Second Order Linear Equations 3.1 Homogeneous Equations with Constant Coefficients
Mar 4 Tue	3.2 Fundamental Solutions of Linear Homogeneous Equations; The Wronskian
6 Thu	**Test 1 (subject to change)**
11 Tue	**Spring Break**
13 Thu	**Spring Break**
18 Tue	3.3 Complex Roots of the Characteristic Equation
20 Thu	3.4 Repeated Roots; Reduction of Order
25 Tue	3.5 Nonhomogeneous Equations; Method of Undetermined Coefficients
27 Thu	3.6 Variation of Parameters
Apr 1 Tue	Chapter 6 The Laplace Transform 6.1 Definition of the Laplace Transform
3 Thu	6.2 Solution of Initial Value Problems
8 Tue	6.3 Step Functions
10 Thu	Review
15 Tue	Review
17 Thu	Review
22 Tue	Review
24 Thu	**Test 2 (subject to change)**
29 Tue	Review
May 1 Thu	Review
6 Tue	**Study Day. No Class**
	Final Exam (time to be determined)

Note: 4/18 Friday (Good Friday) is a study day.

5/5 Monday is the last day for scheduled classes.

May 7-May 13 (Wednesday-Tuesday) is for Final examinations.