

Northern Arizona University
College of the Environment, Forestry, and Natural Sciences
Department of Mathematics and Statistics

MAT 239 (Differential Equations) Syllabus

Spring 2025, 3 Credit Hours

Section 004 (6106) TuTh 12:45-2:30 in AMB 162

Instructor Information

Instructor: Jim Swift Jim.Swift@NAU.edu AMB 110 523-6878 (voice mail only)

Office Hours: M, W 1:45-4:00

If these times are inconvenient, you can make an appointment, or drop by my office any time. E-mail is always a good way to contact me. If you send me email before 9:00pm on nights a WeBWorK assignment is due, I will reply that night.

Websites: Our class website is ac.nau.edu/~jws8/classes/239.2025.1/. I use the class website for most electronic communication. I use Canvas for grades and for posting documents, like practice exams and scanned solutions, that I don't want the world to see.

Course Description

Text: *Elementary Differential Equations* 10th edition, by Boyce and DiPrima. This text is optional, and an older (or newer) edition is almost as good as the 10th. No homework will be assigned from the text. Most or all of the homework will be on WeBWorK. A link to Paul Dawkins' notes is on the web site.

Prerequisite: A grade of C or better in MAT 238 or current registration in MAT 238. You are responsible for making sure that you have met this prerequisite.

Content/Outline: Solutions of first-order differential equations, second and higher order linear equations, systems of linear differential equations, series solutions, numerical solutions of differential equations (chapters 1-5 and 7 of the text, with some skipped sections).

Student Learning Outcomes: Students will learn how to solve first order differential equations that are linear or have some other special form. Students will learn how to solve linear differential equations with constant coefficients. Students will learn how to use differential equations to model physical systems. There are many differential equations that nobody can solve. Students will learn a few methods of finding approximate solutions to these differential equations which cannot be solved exactly.

Course Structure/Approach The class will use lectures and in-class worksheets.

Assessment of Student Learning Outcomes

Points: There will be approximately 700 possible “class points.” All class points are assigned with the scale A (90%), B (80%), C (70%), and D (60%). The timeline for assessment is simple; whenever *class points* are assigned, they they are fully “curved” and will not change further. So at any point students can calculate the fraction of the possible class points obtained so far to determine their current grade.

Midterms: $\approx 43\%$ of grade ($3 \times 100 = 300$ class points) There will be 3 midterm exams. Each exam will have a raw score and a “curved” or scaled score based on 100 possible class points. Calculators are not allowed at the midterm exams or the final exam.

Quizzes and other assignments: $\approx 7\%$ of grade (approximately 50 class points) On some class days there will be a short quiz, worth 5 class points. The point value of the other assignments will be announced when they are assigned.

Homework: $\approx 21\%$ of grade (approximately $18 \times 8 = 144$ class points) We will be using WeBWorK for most of the homework. Each of WeBWorK sets is worth 8 class points.

Final Exam: $\approx 29\%$ of grade (200 class points) The Final Exam will be comprehensive. The final exam is scheduled for
Tuesday, May 6, 12:30-2:30

I might raise your course grade from the 90/80/70 curve by lowering the cutoffs.

Attendance: (6 possible extra credit class points) Attendance is mandatory, and will be recorded at most class periods. At each of the 3 midterms, the students will receive two extra credit points if no absences are recorded since the previous exam. The student will receive one extra credit point if 1 absence is recorded. The student will receive no extra credit if 2 or more absences are recorded.

Extra credit: There are other extra credit opportunities. For example, you get up to 2 class points per week extra credit for our course from points earned in the problem of the week. Problems are graded on a scale of 1 to 4. I’ll give you half that as extra credit class points (0.5 to 2 points).

Course Policies

Calculators: No calculators are allowed at the exams. You may bring a calculator to class on non-exam days.

Laptops and Tablets: These are not allowed at exams, but you may bring them to class to take notes, do in-class worksheets, or do WeBWorK. No social media, etc., please! You can download the pdfs of the worksheets to your tablet, and work the problems with your stylus. Similarly, you can download pdfs of the webwork assignments and work the problems on your tablet.

Late Homework: I can delay your individual due date and when your answers are available for WeBWorK assignments. I will handle requests on a case-by-case basis, but you must contact me *before* the due date. I reserve the right to deny your request.

Missed Class Days: I will allow excused absences, for extra credit purposes, for institutional excuses, illness, or other reasons that I approve. Please notify me of an absence by e-mail or voice mail *before* class if possible. Furthermore, if you are late and I take roll before you arrive, then you will be counted absent.

Makeup Exams: A similar policy to “Missed Class Days” holds. I will give a makeup exam for illness or other emergencies. Please notify me that you will miss an exam by e-mail or voice mail *before* the exam if possible.

Help: If you need help the first person to contact is me. I am your personal tutor at no charge. You can come to my office hours or contact me via e-mail. There is a button in WeBWorK for sending me e-mail. The Student Learning Centers have an array of free services, including drop-in or personal tutoring. Sadly, however, the MAP room, in AMB 137, does not serve MAT 239

Generative AI and the Internet Since mathematical reasoning, problem solving, and critical thinking skills are part of the learning outcomes of this course, all assignments should be prepared by the student. Developing strong competencies in this area will prepare you for a competitive workplace. You may not submit assignments as your own work that directly copy all or a major part of the results of using ChatGPT or AI mathematics assistive technologies (e.g. Wolfram Alpha, PhotoMath, etc.). Such AI-generated submissions are not permitted and will be treated as plagiarism.

AI tools like ChatGPT may be permitted by the instructor to be used in a limited or indirect fashion for a particular type of assignment. In that case the AI tools should be used with caution and proper citation. AI is not a replacement for your own thinking and research. Over reliance on AI tools beyond that explicitly allowed is a violation of the departmental honor and ethics code. Any use of AI tools on quizzes and exams is expressly forbidden.

I suggest that you do not rely too heavily on AI and internet forums to help with the homework. Try each problem first on your own, and if you get stuck then it is OK to seek digital help. The exams do not allow the internet, so the purpose is to learn how to do these problems on your own.

Career Readiness Skills In every class you take at NAU, you learn professional skills that can support your future career. There are several ways that this course can help you meet and excel at your job goals and life desires. Below is a list of in-demand skills from National Association of Colleges and Employers (NACE) you could practice in this class:

- **Communication:** Demonstrate the ability to articulate mathematical concepts clearly and concisely, whether through written explanations, oral presentations, or visual representations, ensuring comprehension by peers.
- **Critical Thinking:** Demonstrate the ability to solve mathematical problems by considering the context in which they arise, ensuring that solutions are relevant and applicable to real-world situations.
- **Professionalism:** Uphold academic integrity and accountability in mathematical assignments, demonstrating honesty and ethical behavior in the completion of individual and group tasks.
- **Teamwork:** Collaborate actively with classmates to achieve common mathematical goals, working collectively on assignments, projects, or problem-solving exercises to enhance the overall learning experience.

Academic Honesty Cheating on exams will not be tolerated, and procedures for reporting cheating to the university will be followed.

Do not look at other people's exams during tests. You may not use cell phones or other electronic communication devices during the exams.

You are allowed and encouraged to work together on homework. However, you are expected to complete your own work. Some quizzes allow collaboration with other students. The policy for each quiz will be clearly stated.

Suggestions: Try to do the webwork problems on your own. Keep an orderly journal with the problem number clearly indicated so you can refer to it. Do the work clearly so you can correct your mistakes. If you get stuck on a problem it is OK to look on the internet for help. But remember, there is no internet, no ChatGPT, "no nothing" allowed on tests. A sure way to fail this course is to have the internet do your webwork for you. Another way to fail the course is to skip many of the webwork assignments.

Another suggestion is to study the in-class worksheets until you understand them deeply. These problems are more in the style of exam questions than the WeBWoRk problems are.

Amendments: Any changes to this syllabus will be announced in class, and the updated version will be posted on my website. This version: January 12, 2025.

NORTHERN ARIZONA UNIVERSITY
DEPARTMENT OF MATHEMATICS AND STATISTICS
UNIVERSITY AND DEPARTMENT POLICIES – Spring 2025

Course Pre-requisites and Placement: Prior to enrollment in a course in the Department, a student must have completed the course prerequisites or have proper placement for the course. It is the student's responsibility to check that they are properly enrolled in a course and to drop the course if they are not. Failure to do so could result in the student receiving no credit for the course. The department may cancel student's registration in a course in which they are not properly enrolled. It is students' responsibility to monitor their own enrollment.

Administrative Drops: A student may be administratively dropped through the 7th business day (**January 22, 2025**) from a course by the instructor if the student meets either of the two following criteria: (1) has not met the prerequisites for the course as stated in the academic catalog, or (2) is absent one or more times from class during the first four business days of the semester.

Class Attendance: Students are expected to assume full responsibility for class attendance and are accountable for work missed because of absences. Instructors are under no obligation to make special arrangements for students who have been absent unless such absence has been excused by a formal institutional excuse. Institutional excuses permit a student to be absent from classes to represent the University in athletics and extracurricular or academic activities. Institutional excuses must be hand-delivered to the instructor and arrangements made for the work missed prior to the planned absence from class.

Adding/Dropping/Auditing a Course: The last day to add a class is **January 23, 2025**. The last day to add to a waitlist is **January 22, 2025**. The last day to drop/delete a course (*without the class appearing on your transcript*) is **January 23, 2025**. The last day to drop a course (and receive a **W**) is **May 2, 2025**. Academic policy requires that a student who never attended class or stopped attending class receive an **F** should the student fail to officially drop the course. The deadline to change from credit to audit or vice versa is **January 23, 2025**. Once a student has registered and completed a class as an auditor, the audit grade cannot be changed to a credit-earning grade. The grade of **AU** is awarded to auditors for satisfactory attendance. More information can be found at <http://catalog.nau.edu/>.

The Grade of Incomplete: A student, who, for reasons beyond the student's control, is unable to complete course requirements during the instructional period, may make a request to the instructor for a grade of Incomplete (**I**). The student must be passing the course and must have completed a majority of the course. Before a grade of **I** can be given the student and instructor must complete the official department form indicating the work to be completed, as well as the date(s) by which the work must be completed. All work must be completed within one year. After one year, a grade of **I** automatically reverts to a grade of **F**.

Final Examinations: Final examinations are required in all classes and must be given at the scheduled times and dates indicated in the university final exam schedule. An exception to the official final examination schedule can be made if a student is scheduled to take more than two examinations in a 24-hour period. For more information, see the schedule at https://in.nau.edu/wp-content/uploads/sites/153/2024/06/FINAL_EXAM_Sched_1251_Spring-2025.pdf

NAU Policy Statements: Additional institutional Syllabus Policy Statements can be found at https://nau.edu/wp-content/uploads/sites/26/Syllabus-Policy-Statements_August_5_2024.pdf

Department Policy on Use of Portable Electronic Devices: Cell phones, mp3 players and portable electronic communication devices, including but not limited to smart phones, cameras, and recording devices must be turned off and inaccessible during in-class knowledge assessments. Any violation of this policy will be treated as a violation of the student academic integrity policy.

NAU SYLLABUS POLICY STATEMENTS

ACADEMIC INTEGRITY

NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people's ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU's online academic integrity workshop available in the E-Learning Center and should review the full *Academic Integrity* policy available at

<https://www9.nau.edu/policies/Client/Details/1443?whosLooking=Students&pertainsTo=All>.

ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) technologies bring both opportunities and challenges. Ensuring honesty in academic work creates a culture of integrity and expectations of ethical behavior. The use of these technologies can depend on the instructional setting, varying by faculty member, program, course, and assignment. Please refer to course policies, any additional course-specific guidelines in the syllabus, or communicate with the instructor to understand expectations. NAU recognizes the role that these technologies will play in the current and future careers of our graduates and expects students to practice responsible and ethical use of AI technologies to assist with learning within the confines of course policies.

COPYRIGHT INFRINGEMENT

All lectures and course materials, including but not limited to exams, quizzes, study outlines, and similar materials are protected by copyright. These materials may not be shared, uploaded, distributed, reproduced, or publicly displayed without the express written permission of NAU. Sharing materials on websites such as Course Hero, Chegg, or related websites is considered copyright infringement subject to United States Copyright Law and a violation of NAU Student Code of Conduct. For additional information on ABOR policies relating to course materials, please refer to ABOR Policy 6-908 A(2)(5).

COURSE TIME COMMITMENT

Pursuant to Arizona Board of Regents guidance (ABOR Policy 2-224, *Academic Credit*), each unit of credit requires a minimum of 45 hours of work by students, including but not limited to, class time, preparation, homework, and studying. For example, for a 3-credit course a student should expect to work at least 8.5 hours each week in a 16-week session and a minimum of 33 hours per week for a 3-credit course in a 4-week session.

DISRUPTIVE BEHAVIOR

Membership in NAU's academic community entails a special obligation to maintain class environments that are conducive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not interfere with normal class activities or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a

student from a course with a grade of “W”. For additional information, see NAU’s *Disruptive Behavior in an Instructional Setting* policy at <https://nau.edu/university-policy-library/disruptive-behavior>.

NONDISCRIMINATION AND ANTI-HARASSMENT

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, veteran status and genetic information. Certain consensual amorous or sexual relationships between faculty and students are also prohibited as set forth in the *Consensual Romantic and Sexual Relationships* policy. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU’s *Nondiscrimination and Anti-Harassment* policy. To report a concern related to possible unlawful discrimination or harassment or to request a time to meet, please use the [Report an Issue Form](#). To file a complaint, please submit the online [Complaint Form](#). EAO also assists with religious accommodations. To request a religious accommodation, please use the [Religious Accommodation Request Intake Form](#). EAO additionally provides access to lactation spaces, and please use to the [Lactation Space Request Form](#) to request use of a location. For additional information about nondiscrimination or anti-harassment, contact EAO at EquityandAccess@nau.edu, or visit the EAO website at <https://nau.edu/equity-and-access>. The EAO is located in Old Main on the first floor.

TITLE IX

Title IX of the Education Amendments of 1972, as amended, protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. In accordance with Title IX, Northern Arizona University prohibits discrimination based on sex or gender in all its programs or activities. Sex discrimination includes sexual harassment, sexual assault, relationship violence, and stalking. NAU does not discriminate on the basis of sex in the education programs or activities that it operates, including in admission and employment. NAU is committed to providing an environment free from discrimination based on sex or gender and provides a number of supportive measures that assist students, faculty and staff employees, and covered guests.

One may direct inquiries concerning the application of Title IX to either or both the university Title IX Coordinator or the U.S. Department of Education, Assistant Secretary, Office of Civil Rights. You may contact NAU’s Title IX Coordinator at titleix@nau.edu or by phone at 928-523-5434. In furtherance of its Title IX obligations, NAU promptly will investigate or equitably resolve all reports of sex/gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. To submit a report, please use the [File a Report Form](#). The Office for the Resolution of Sexual Misconduct (ORSM): Title IX Institutional Compliance, Prevention & Response addresses matters that fall under the university’s [Sexual Misconduct Policy](#). ORSM also facilitates reasonable modifications for pregnant or parenting individuals. Additional important information and related resources, including how to request help or confidential support following conduct covered by the Sexual Misconduct Policy, is available on the [ORSM web site](#), and you also may contact the office at titleix@nau.edu. The ORSM is located in Gammage on the third floor.

ACCESSIBILITY

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), 928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at <https://nau.edu/disability-resources/> or by contacting Disability Resources. The

Director of Disability Resources, Jamie Axelrod, serves as NAU's Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

RESPONSIBLE CONDUCT OF RESEARCH

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at <https://nau.edu/research/compliance/research-integrity>.

MISCONDUCT IN RESEARCH

As noted, NAU expects every student to firmly adhere to a strong code of academic integrity in all their scholarly pursuits. This includes avoiding fabrication, falsification, or plagiarism when conducting research or reporting research results. Engaging in research misconduct may result in serious disciplinary consequences. Students must also report any suspected or actual instances of research misconduct of which they become aware. Allegations of research misconduct should be reported to your instructor or the University's Research Integrity Officer, Scott Pryor, who can be reached at scott.pryor@nau.edu or 928-523-5927. More information about misconduct in research is available at <https://nau.edu/university-policy-library/misconduct-in-research>.

SENSITIVE COURSE MATERIALS

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies, students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

Last revised August 5, 2024