

Course Info



RIO SALADO COLLEGE

A MARICOPA COMMUNITY COLLEGE

Modern Differential Equations

MAT277 19668 Spring 2025

Start Date: Feb 10, 2025

End Date: May 23, 2025

Credits: 3

Modality: In Person

Instructor Information

Name: Steven B. Felling B.S.E.E., M.Ed.

Contact Information:

Email: sfelling@tempeunion.org

Phone: 480-706-7900

Location: C-105

Office Hours: 3:40-4:40pm Monday, Tuesday, Thursday, Friday and 8:00-8:30am Monday through Friday

Course Competencies

Official Course Description

Introduces differential equations, theoretical and practical solution techniques with applications. Problem-solving using MATLAB.

Official Course Prerequisites

Prerequisites: A grade of C or better in MAT230 or MAT231 or permission of Department/Division Chair.

Official Course Competencies

1. Solve analytically and numerically ordinary differential equations, primarily of first or second order, using exact, implicit, or discrete approximation solution types. (I, II, III)
2. Solve analytically and numerically systems of ordinary linear differential equations using matrix methods and Laplace Transforms or differential operator methods. (III, IV)
3. Solve application problems using differential equations. (I, II, III, IV)
4. Linearize non-linear systems and describe the long-term behavior of solutions. (IV)
5. Read and interpret quantitative information when presented numerically, analytically or graphically. (I, II, III, IV)
6. Compare alternate solution strategies, including technology. (I, II, III, IV)
7. Justify and interpret solutions to application problems. (I, II, III, IV)
8. Communicate process and results in written and verbal formats. (I, II, III, IV)

Course Materials

Required Course Materials

Title	Edition	Author	ISBN
A first Course in Differential Equations with Modeling Applicatio	9th	Zill, Dennis G.	9780495108245
GNU Octave			
Graphing Calculator TI-83 or TI-84			

Standards and Expectations

This dual enrollment course follows a college-level curriculum. High school policies may differ from the policies that apply to dual credit.

Time Requirement

You will need to dedicate significant time to this college course. For each credit hour, plan to spend at least two hours a week on homework in addition to class presentation time.

Course Calendar

Weeks

Lessons

	-Course Introduction
21	-Ch1/2 First order differential equation solving methods (Introduction to differential equations, terminology, initial value problems, slope fields, solving by Separation of Variables)
22	Ch1/2: First order differential equation solving methods (Linear equations, Exact solutions, Bernoulli and Composition of Functions form Substitutions, Euler's Method)
	Ch1/2 review
23	**Ch1/2 Test (First order differential equation solving methods)
24	Ch3 Applications of First Order Differential Equations (Growth/Decay, Compound Interest, Radioactivity/Carbon Dating, Newton's Law of Cooling, Series Electrical Circuits, and non-linear models for falling masses with air resistance and the logistic growth model).
	Ch3 continued
25	**Ch3 Test (Applications of first-order differential equations)
26	Ch4: Higher-order differential equation solving methods Solving higher Order Differential Equations (Determining independence using the Wronskian, Reduction of Order to find a 2nd solution from a 1st solutions, solving homogeneous linear DEs with constant coefficients using an auxiliary equation, non-homogeneous DEs using Method of Undetermined Coefficients).
	Ch4: Higher-order differential equation solving methods (Variation of Parameters, Cauchy-Euler equations)
27	Ch4 review
28	Ch5: Applications of Higher-order Differential Equations (Mass/spring systems - oscillations, damping, resonance, linear models for LRC Series Electrical Circuits).
	Ch5 review
29	**Ch5 Test
30	Ch7: Laplace Transforms (Definition of Laplace Transform, Inverse Laplace Transforms, Using Laplace transform to solve DEs including shifting on t-axis).
31	Ch7: Laplace Transforms (Using Laplace transform to solve DEs including shifting on s-axis and t-axis, Unit Step Function and Dirac Delta Function)
	Ch7: review
32	** Ch7 Test (Laplace Transforms)
33	Ch8: Systems of Differential Equations (Matrix form of a DE system, Solution Curves/Phase Plane Trajectories, Eigenvalues/Eigenvectors for single, repeated, and complex eigenvalue cases.)
34	Ch8: Systems of Differential Equations (Phase Portraits, solving non-homogeneous systems using Method of Undermined Coefficients and Variation of Parameters)
35	Ch8: Systems of Differential Equations (solving non-homogeneous systems using Method of Undermined Coefficients and Variation of Parameters, Initial Conditions, Writing a single higher-order DE as a system of first-order DEs.)
36	Solving Differential Equations using MATLAB/OCTAVE (the concept of numerical analysis, OCTAVE programming interface, programming project examples: 2nd-order mass/spring systems, Predator-Prey Models, using Newton's Law of Cooling to investigate a forensic science scenario). ** This is a programming-project based unit **
37	Solving Differential Equations using MATLAB/OCTAVE (the concept of numerical analysis, OCTAVE programming interface, programming project examples: 2nd-order mass/spring systems, Predator-Prey Models, using Newton's Law of Cooling to investigate a forensic science scenario). ** Assessment is built into the programming projects **
38-39	**Course Review and Final Exam

Grading Standards

Grade

Percentage

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	Below 60%

Attendance Standards

Regular Attendance is important. Students are allowed 10 absences (excused or unexcused) per semester for in-person instruction. The 11th total absence may result in loss of credit unless there are extenuating circumstances. School related absences do not count toward your student's total absences. For more information refer to the [Desert Vista Attendance Policy](#).

Be prepared to take missed tests/quizzes immediately upon your return to class unless you have made prior arrangements with the instructor.

Late Policy

All assigned work must be completed by designated due dates as stated in chapter assignment calendar.

*All tests must be taken as scheduled unless **PRIOR** arrangements have been made (contact can be made in person or via email).*

Equipment Use Policy

You may be assigned a computer for classroom use. You are to only use the computer in the designated websites. You are not to add or make any changes to the computer. Failure to abide by these policies will cause you to lose your computer privileges.

College Policies

Extra Credit Policy:

There are no extra-credit assignments for this class. The scheduled assignments and exams are sufficient to test understanding of the materials presented in the course.

Academic Misconduct:

Academic Misconduct includes cheating, conspiring to cheat, soliciting to cheat, attempting to cheat, plagiarism, fabrication on an assignment, or other forms of dishonest presentation.

Posting assessments on an unauthorized web site, soliciting assessment answers and the unauthorized acquisition of assessments, assessment answers, or other academic material is cheating. Unless approved by the instructor, turning in content created by essay generators or other types of artificial intelligence platforms is also academic misconduct.

Plagiarism includes, but is not limited to, the use of paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling or sharing of term papers or other academic materials. Information gathered from the Internet and not properly identified is also considered plagiarism.

We expect every student to produce his/her original, independent work. Any student whose work indicates a violation of the [MCCCD Academic Misconduct Policy](#) (including cheating and plagiarism) can expect sanctions as specified in the college catalog.

Rio Salado College uses software that uncovers plagiarism from student to student and other data sources on the Internet. If a student is found to have plagiarized content, grade consequences will be applied in accordance with departmental policies.

Civility Policy:

The faculty of Rio Salado place a high value on the importance of general ethical standards of academic behavior and expect that communication between students and instructors or among students shall maintain the level of formality and mutual respect appropriate to any college teaching/learning situation. Language or behavior that is rude, abusive, profane, disruptive, or threatening will not be tolerated. Activity of this type is Academic Misconduct as defined in MCCCD Policy AR 2.3.11. Student engaging in such behavior will be removed from the course with a failing grade. Additional sanctions may be applied pursuant to AR 2.3.11.

Refund Policy:

Refunds are not automatic. Students who drop courses within the refund period are eligible for a reimbursement of appropriate tuition. Deadlines and details are available online at <http://www.riosalado.edu/cashier/Pages/refund.aspx>.

Classroom Accommodations for Students with Disabilities

In accordance with the Americans with Disabilities Act, the Maricopa County Community College District (MCCCD) and its associated colleges are committed to providing equitable access to learning opportunities to students with documented disabilities (e.g. mental health, attentional, learning, chronic health, sensory, or physical). Please work with your high school accommodations team to provide approved and appropriate accommodations in dual enrollment courses. For more

information please feel free to reach out to the college's disability services at 480-517-8562 or Disability.Services@riosalado.edu

Addressing Incidents of Sexual Harassment/Assault, Dating/Domestic Violence, and Stalking

In accordance with Title IX of the Education Amendments of 1972, MCCCDC prohibits unlawful sex discrimination against any participant in its education programs or activities. The District also prohibits sexual harassment—including sexual violence—committed by or against students, District employees, and visitors to campus. As outlined in District policy, sexual harassment, dating violence, domestic violence, sexual assault, and stalking are considered forms of "Sexual Misconduct" prohibited by District policy. Visit <https://district.maricopa.edu/mandatory-drs-title-ix-syllabus-statements> for more information.

Tuition Assistance

Tuition Assistance is available to students enrolled in a Rio Salado College dual enrollment courses who demonstrate financial need. Details are available online at <http://www.riosalado.edu/dual/>

Student Responsibility

In addition to being responsible for the information outlined in this syllabus, students are responsible for familiarizing themselves with the Rio Salado College policies in the college catalog and student handbook, which are available online at <https://www.riosalado.edu/student-resources/student-solution-center/student-policies>

Disclaimer

Course content and syllabus may vary from the course calendar listed above in order to meet the needs of the particular group in this course section.

Change of Address

Please notify Admissions, Records and Registration at (480) 517-8540 of any changes in contact information or log into your Student Center to update your address.

Acknowledgement Form

Signature: _____

Date: _____

If there are any changes in these policies, students will be informed at the time of the change.