Course Syllabus Details

Topic	Detailed Information
Course Name	Intro to Differential Equations and Applications
Course - Section and Term	MAT 2560-R11
GT Pathways Category	GT-MA1
Credits and Delivery Method	3 Credits, Remote
Time Expectation	3*3 = 9 hours per week, expected.
Location of Class	ZOOM: https://us02web.zoom.us/j/82182415350?pwd=G9yCmRuqpdbEGyvZicentB1grpBoJP.1 Passcode: 508215
Meeting Dates and Time	11:15 a.m. – 12:30 p.m., Tuesday, Thursday.
Instructor	Harry S. (Steve) Mills
E-mail	Hmills1@online.aims.edu
Office Location	Call me at the number, below, any time, and we will use the link, above.
Phone Number	970-290-0550
Office Hours	24/7 – This seems crazy, but it turns out to be less work for me, and best service for my students. It's a little crazy the first couple of weeks, but then everybody knows what they're doing!
Drop Deadline Date	9/9/24
Course Withdrawal Date	11/6/24
Other Important Dates	https://www.aims.edu/resource-library/academic-calendars If desired include dates for assessments See Course Schedule:
Student Services	https://www.aims.edu/student-life/student-services
Mental Wellness	If you are experiencing an immediate mental health concern the following resources are available: *Call or text 988 or visit 988 LIFELINE *Colorado Crisis Services @ 1-844-493-8255 or Text "Talk" to 38255

Topic	Detailed Information
	Select [Academic Policies](https://www.aims.edu/academic-policies) to access more mental wellness, basic needs support, and success resources. (https://www.aims.edu/academic-policies)

Course Requirements

Topic	Detailed Information
Prerequisite(s)	MAT 2420 (Calculus II)
Co-requisite(s)	None
Academic Policies – These Standards of Behavior statements apply to every course at Aims Community College and are hereby incorporated into this document.	Closely review these [Academic Policies](https://www.aims.edu/academic-policies). (https://www.aims.edu/academic-policies) Integrity, common sense, and common courtesy.
Materials	Register for WebAssign in D2L Course Shell: Login to https://online.aims.edu/d2l/login Navigate to this course from the available thumbnails. Go to "Content > Course Information > WebAssign Portal" This is where all online homework and testing will take place.
Other Necessary Items	If you want a physical textbook for the course, I recommend any edition of College Algebra, by Stewart, Redlin, and Watson. Technically, we're using the 8th edition, but I think any edition will suffice. Thriftbooks, eBay, Amazon, … All can beat the price of a new book by a mile. The 8th Edition is pictured on the left. The picture on the cover is different for different editions. Make Good Scans: For the transmission of your handwritten work (5 writing projects), you will need to make high-quality PDFs of your well-written work. Some students get professional-looking scans using a phone app, like CamScanner. I recommend getting a decent printer-scanner, but you can also use a commercial copy center (like Kinko's) near you, or use the services available at the Learning Commons..

Topic	Detailed Information
Other Necessary Items (Cnt'd)	Here is a handy link for scanning and other technology resources available at our Leaning Commons: https://www.aims.edu/departments/learning-commons/computer-and-technology-assistance

Course Information

Course Description:

Explores techniques of problem solving and applications. Topics include first, second, and higher order differential equations, series methods, approximations, systems of differential equations, and Laplace transforms. This is a statewide Guaranteed Transfer course in the GT-MA1 category.

Course Learning Outcomes – According to the Colorado Community College Common Course Database, upon completion of this course, the student/learner should be able to:

1. Recognize and classify differential equations.

2. Use graphical approaches to analyze solution curves.

3. Solve first and second order linear, homogeneous and nonhomogeneous differential equations using classical techniques.

4. Solve first and second order linear homogeneous and linear nonhomogeneous differential equations using Laplace Transforms and power series.

5. Solve 2 by 2 linear homogeneous systems of differential equations.

6. Apply differential equations to solve various problems in the physical and natural sciences.

Topical Outline – These topics will be covered in class, but not necessarily in this order:

Copy and paste the previous three items from the CCNS database (choose the current semester/term) found at this link:

I)Recognize and classify differential equations.
a. Classification by type
b. Classification by order
c. Classification by linearity
II) Use graphical approaches to analyze solution curves.
a. Slope fields
b. Phase lines
c. Phase planes
III) Solve first and second order linear, homogeneous and nonhomogeneous differential equations using classical techniques.
a. Separation of variables
b. Integrating factor method

c.   Method of undetermined coefficients
d.   Method of variation of parameters
e.   Methods of substitution such as reduction of order, y over x, etc.
f.   Exact equations
g.   Auxiliary equations including distinct roots, repeated roots, and imaginary roots
h.   Linear independence
i.   Wronskian Determinants to prove linear independence
j.   Existence and Uniqueness Theorem
IV)   Solve first and second order linear homogeneous and linear nonhomogeneous differential equations using Laplace Transforms and power series.
a.   Laplace transformations of elementary functions
b.   Laplace transformations of periodic functions and derivatives
c.   Laplace transformations of inverse transforms
d.   Power series solutions
V)   Solve 2 by 2 linear homogeneous systems of differential equations.
a.   Matrix forms for systems of differential equations
b.   Distinct real, repeated and complex eigenvalues
VI)   Apply differential equations to solve various problems in the physical and natural sciences.
a.   Spring - mass systems
b.   Growth and decay
c.   Newton's Law of Cooling

State General Education and Common Learning Outcomes: (for GT Pathways Courses)

GT-MA1: MATHEMATICS CONTENT CRITERIA (General)

Students should be able to:

a)   Demonstrate good problem-solving habits, including:

•   Estimating solutions and recognizing unreasonable results.

•   Considering a variety of approaches to a given problem, and selecting one that is appropriate.

•   Interpreting solutions correctly.

b)   Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.

c)   Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.

d)   Apply mathematical concepts, procedures, and techniques appropriate to the course.

e) Recognize and apply patterns or mathematical structure.

Utilize and integrate appropriate technology.

GT-MA1 COMPETENCY & STUDENT LEARNING OUTCOMES (General)

Competency: Quantitative Literacy:

Students should be able to:

1. Interpret Information

a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).

2. Represent Information

a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

3. Perform Calculations

a. Solve problems or equations at the appropriate course level.

b. Use appropriate mathematical notation.

c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.

4. Apply and Analyze Information

a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.

b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.

c. Make judgments based on mathematical analysis appropriate to the course level.

5. Communicate Using Mathematical Forms

a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

6. Address Assumptions (required of Statistics courses only)

Describe and support assumptions in estimation, modeling, and data analysis, used as appropriate for the course.

Aims Common Learning Outcomes – These outcomes define the expectations of an Aims Community College education and provide the benchmarks against which the college holds itself accountable. Find the outcomes at

https://www.aims.edu/departments/institutional-research/assessment

Communication Regarding Closures

Our course is generally immune to the weather and other vicissitudes of Nature.

Code of Conduct

Students are expected to conduct themselves in a manner compatible with the function of Aims Community College as a public educational institution. Students must assume responsibility for their actions; observe federal, state and local laws and college regulations; and respect the rights, privileges and property of others. We are committed to the highest standards of respect for self and others, academic excellence, integrity, and civil discourse. As such we will cultivate an environment of mutual respect and responsibility. Download the complete copy of the Student Code of Conduct.

"Common sense, common courtesy, and academic integrity" pretty much covers it all, in my book.

Reuse of Instructional Materials

Reuse or distribution of instructional materials (e.g., PowerPoints, videos, class recordings, assessments, etc.) or student created content (e.g., online discussion posts, presentations, etc.) without approval is prohibited.

(After the above "sections", faculty may insert here or in a separate document, any course specific information, in whatever form they choose. Faculty should include and cover, at a minimum, the four pieces of information listed below. If faculty choose to put this information in a separate document, they must also include the "syllabus logo" in the top left corner of all other documents.)

Attendance Policy

I don't grade on attendance. I just hold you responsible for any material covered in class. Video of the day's talk and the notes I put on the board will be uploaded, daily, and housed on my private server, https://www.harryzaims.com/.

Communication and Feedback

Good thing about feedback: It's instant.

Bad thing about feedback: It's online.

This course, being designated "remote," will use WebAssign for the greater part of assigned work and tests; however, there will be Writing Projects, where your written work will be scanned to PDF, and graded by hand, by me. There will also be a Written Midterm and Written Final (See Course Schedule). You will come in to Horizon Hall (or other location, as needed) for a 2-hour test for Midterm and Final.

Use hmills1@online.aims.edu to contact me by e-mail. This may also be accomplished by clicking on "Classlist" tab in the Course Shell and clicking on "Mills, Steve" in the listing. It is best to use your online.aims.edu e-mail when communicating with me in e-mail. Otherwise, I might not have your information at my fingertips.

Call or text me at 970-290-0550 if you have something urgent, or wish for a 1-on-1.

Grading

WebAssign Tests – 25% - Taken from WebAssign Question Bank. Your best resources for these are your notes and homework.

Written Tests – 25% - These are traditional written tests that must be taken in-person. Your best resources for these are your notes and homework.

WebAssign Homework: 20%

Writing Projects: 20% - A selection of written exercises to be submitted as PDFs.

Attendance will be measured by your successful completion of assignments. There may be times when your time is better spent working on exercises, rather than listening to a traditional lecture, especially one of my lectures. Just be aware that you're responsible for all the notes delivered in lecture. As they are posted on harryzaims.com, that should be no hardship.

Grading Scale

Percentage	Grade	Details
90% - 100%	A	(Superior and excellent)
80% - 89%	B	(Above average)
70% - 79%	C	(Average)
60% - 69%	D	(Below average level of achievement)
Below 60%	F	(Not acceptable)

Testing Requirements

If proctoring at a non-Aims site is required, students may incur an additional cost.

Other Important Details

Add any other important and pertinent information below. For example, specific assignment information and how they will be graded or student success tips.

Course Schedule:

Broken down by week, class session, etc. Consider including as a separate document for ease of use. It is helpful to have chapter titles attached (versus just Chapter 1, Chapter 2) and to also associate which Common Learning Outcome (CLO) is addressed in that chapter.