Mayville State University

Math 412-02, Differential Equations (Online) - 27710

Fall 2025
3 Credit Hours

Course and Instructor Information

Instructor Name: Dane A. Henke

Contact Information:

Office: Classroom Building Room 108B

Email: dane.a.henke@mayvillestate.edu

Work phone: 701-788-4684

Hours of Availability:

Monday 9:00 – 9:50 AM, Wednesday 9:00 – 9:50 AM, Thursday 11:00 – 11:50 AM

Also available for meetings on other days and times by appointment.

Instructional Mode: Online asynchronous.

Course Dates: August 25 to December 19

Time Zone: All times indicated throughout this syllabus reflect Central Time (CT).

Meeting Times and/or Location Asynchronous

Final Exam Time and Location: Thursday December 18 12:00PM (noon)

Course Materials and Technologies

The main text that will be utilized in this course is a conglomerate of two different free online texts.
Main Book: "MAT-204: Differential Equations for Science (Lebl and Trench)." *Mathematics LibreTexts*, 27 Feb. 2022, math.libretexts.org/Courses/Lake_Tahoe_Community_College/MAT-204%3A_Differential_Equations_for_Science_(Lebl_and_Trench). https://math.libretexts.org/Courses/Lake_Tahoe_Community_College/MAT-204%3A_Differential_Equations_for_Science_(Lebl_and_Trench)

A PDF copy of the book is available in Blackboard under 'Course Information'. It is recommended you download the PDF from blackboard instead of relying on the PDF online.

Source Book 1: Trench, William . "Elementary Differential Equations with Boundary Value Problems (Trench)." *Mathematics LibreTexts*, 7 June 2018, math.libretexts.org/Bookshelves/Differential_Equations/Elementary_Differential_Equations_with_Boundary_Value_Problems_(Trench). Accessed 25 Aug. 2025. https://math.libretexts.org/Bookshelves/Differential_Equations/Elementary_Differential_Equations_with_Boundary_Value_Problems_(Trench)

Source Book 2: Lebl, Jiri. "Differential Equations for Engineers (Lebl)." *Mathematics LibreTexts*, 7 Nov. 2013, math.libretexts.org/Bookshelves/Differential_Equations/Differential_Equations_for_Engineers_(Lebl). https://math.libretexts.org/Bookshelves/Differential_Equations/Differential_Equations_for_Engineers_(Lebl)

Required

MSU Technology Requirements

- Computer with access to internet. Web sites may be used for learning purposes. Use of phones/computers during exams/quizzes will not be allowed.
- Calculator that performs basic operations as well as exponents, logarithms, and radicals.

Use of Artificial Intelligence in this Course

Artificial intelligence (AI) tools, including platforms like ChatGPT, Wolfram Alpha, Symbolab, or Photomath, may be useful in supporting your learning in this course. However, their use is governed by the following expectations:

ACCEPTABLE USE: You may use AI tools to explore concepts, check your understanding, or verify calculations after you have attempted the problems on your own. These tools can help explain steps, clarify mathematical reasoning, or offer different solution methods – provided you engage critically with the material and understand the solution process.

UNACCEPTABLE USE: Relying on AI to complete homework, quizzes, or assessments without doing your own work undermines the learning process and constitutes academic dishonesty. Submitting AI-generated answers as your own, especially without understanding the steps involved, is not allowed.

Course Description

This course is a study of ordinary differential equations with applications. Students will gain experience modeling with differential equations, using direction fields, Euler's method, separable equations, linear differential equations, second order linear differential equations, non-homogeneous linear equations, as well as applications of second-order differential equations, to gain knowledge of the application of the use of differential equations.

Pre-/Co-requisites: MATH 265

Course Objectives

Students will gain experience modeling with differential equations, using direction fields, Euler's method, separable equations, linear differential equations, second order linear differential equations, non-homogeneous linear equations, as well as applications of second-order differential equations, to gain knowledge of the application of the use of differential equations in predator-prey systems, as models for population growth, in mixture problems, spring applications and circuits.

To successfully complete this course, the learner will be expected to meet the following objectives, as aligned to Mathematics Education Program Approval Standards through North Dakota's Education Standards and Practices Board (ND ESPB):

1. The student will be able to solve first and second order differential equations.

2. The student will determine the order and type of differential equations to solve linear, Bernoulli, separable, and homogeneous differential equations.
3. The student will use direction fields and Euler's method to graph a specific solution.
4. The student will apply knowledge about differential equations to solve predator-prey, population growth, spring, circuit, and mixture problems.

Standards Alignment (Mathematics Education Program Approval Standards-ND ESPB):
• 11010.1 Mathematical Practices and Processes: The program requires the candidate to demonstrate the following: a. makes sense of problems and perseveres in solving them, b. reasons abstractly and quantitatively, c. constructs viable arguments and proofs, d. critiques the reasoning of others, e. uses mathematical models, f. attends to precision, g. identifies elements of structure, h. engages in mathematical communication
• 11010.2 Mathematical Connections: The program requires the teacher candidate to demonstrate the interconnectedness of mathematical ideas and how they build on one another. The candidate recognizes and applies connections among mathematical ideas and across various content areas as well as real-world contexts, using the language of mathematics to express ideas precisely, both orally and in writing to multiple audiences
• 11010.6 Instructional Tools: The program requires the teacher candidate to select and use appropriate instructional tools such as manipulatives and physical models, drawings, virtual environments, spreadsheets, presentation tools, and mathematics-specific technologies (e.g., graphing tools, interactive geometry software, computer algebra systems, and statistical packages); and makes appropriate decisions about when such tools enhance teaching and learning, recognizing both the insights to be gained and possible limitations of such tools

Course Expectations

Instructor/Student Communication

You are accountable for all academic communications sent to their Mayville State University email address. You should check your university email at least once a day. You are also responsible for frequently logging into blackboard and attending office hours if needed.

Regular attendance and participation are expected. This includes asking and answering questions, working on in-class activities and assignments, etc. Read the book. Take meaningful notes. Videos and PowerPoints for each lesson are posted in Blackboard. Please stop by my office anytime you have a question!

Assignments and Assessments

Assignments: Assignments will be assigned MyOpenMath with notification posted on Blackboard. Other assignments will be posted on Blackboard as needed.
Quizzes: One to two quizzes per chapter.
Assessments: There will be two tests throughout the semester and an application project midway through the semester. The final exam on Dec. 18 at 12:00 PM (noon).

Evaluation and Grading

Grading Policies

Your grade will be determined using a percent based on total points.
Points will be earned by completing the following:

- Homework Assignments (varies ~10 points each)
- 1-2 quizzes per chapter (20-25 points each)
- 2 exam (80 to 100 points each)
- Project (points will vary)

Late work will result in a point reduction for that assignment.
Letter grades will be assigned only at the end of the semester. Points will be assigned for all work during the semester.

I will review your assignment for completion and provide feedback when necessary. All assignments must be submitted within one week of the due date to receive any credit.

Quizzes and Assessments: Quizzes are worth more points than assignments, and assessments are worth more points than quizzes. Total points for each quiz/assessment will vary. If you are absent (unexcused) on the day of an assessment, 10% will be deducted from grade. If the final is taken at a date/time other than what is scheduled, the earned grade will be dropped one letter grade.

Attendance/Participation Policies

If illness or other circumstances prevent you from attending class, contact me prior to your absence. It is your responsibility to ask for work missed during an absence. You are responsible for keeping up with work assigned whether you attended class or not. Work is due on the due date even if you are absent. **If you miss class unannounced, you have 2 weekdays to arrange make up activities, quizzes, or assessments. After that, missed work will receive a zero.**

Grading Scale

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

Breakdown of Grades

This class uses a total points grading system. Your final grade is calculated by dividing the total points earned throughout the semester by the total points available from assignments and assessments.

Instructions for Scanning Work

When scanning your work, **make sure that multiple pages are scanned into a single PDF document.**

Option 1: Use a scanner. Email the scan to yourself. Download your scan. Submit your scanned document in Blackboard.

Option 2: Download the app "CamScanner" to scan your documents. After scanning all your pages in **one** document, select the document and select "share." Then choose "Share PDF." Share to your email. Open the email on your computer and download the PDF to your computer. Submit this **single PDF** in Blackboard. The app is free to use unless you decide to make in-app purchases.

Option 3: If you have an iPhone, iPad, or Android, you can use your device to scan documents! This is different from hitting the camera button and taking a picture.

iPhone/iPad Instructions

a. Open a note or create a new note  .

b. Tap  , then tap "Scan Documents."

c. Place your document in view of the camera on your device.

d. If your device is in Auto mode, your document will be automatically scanned. If you need to manually capture a scan, tap  or one of the Volume buttons.

e. Drag the corners to adjust the scan to fit the page, then tap "Keep Scan."

f. You can add additional scans to the document or tap "Save" when you are done.

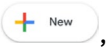
g. Tap the arrow next to scanned documents for a drop-down menu. 

h. Select "Share"  and email the scan to yourself.

i. Open the email on your computer and download the .pdf file. Submit to Blackboard.

Android Instructions

a. Open Google Drive app  .

b. In the bottom right corner, tap "Add" 

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c. Tap "Scan" or "Use Camera"  .

d. Take a photo of the document you would like to scan.

i. Adjust scan area: Tap "Crop"  .

ii. Take photo again: Tap "Re-scan current page"  .

iii. Scan another page: Tap "Add" .

e. To save the finished document, tap "Done" 

f. Open the file in Google Drive and download to your computer. Submit to Blackboard

Enrollment Verification

Online Course Statement

The U.S. Department of Education requires instructors of online courses to provide an activity which will validate student enrollment in this course. The only way to verify that a student has been in this course is if he, she, or they perform an action in the LMS, such as completing an assignment or taking a quiz. Logging into the LMS is **NOT** considered active course participation. Please complete the designated enrollment verification activity by the date indicated. If it is not complete your enrollment in this course will be at risk.

Proctor Notification

This course will use an asynchronous proctoring solution called YuJa. Quizzes/Assessments need to be self-proctored using YuJa Verity and will not be accepted without a recording of the YuJa Verity exam proctoring session. Please read the instructions for YuJa Verity in Blackboard: Week 1> Enrollment Verification Activities> Instructions for YuJa Verity

Important Student Information

In the Announcements section of the Blackboard Institution Page, you can view and download the Important Student Information document for the current academic year. It includes information about:

- ✓ Land Acknowledgement Statement
- ✓ Academic Grievance Concerns and Instructor English Proficiency
- ✓ NetTutor - Online Tutoring Program
- ✓ Starfish - Student Success System
- ✓ Students with Documented Disabilities
- ✓ Student Learning Outcomes / Essential Learning Outcomes
- ✓ Academic Honesty
- ✓ Emergency Notification
- ✓ Continuity of Academic Instruction for a Pandemic or Emergency
- ✓ Family Educational Rights and Privacy Act of 1974 (FERPA)
- ✓ Diversity Statement (Title IX)

Course Timeline/Schedule

During this course, we will work to cover topics from chapters 1, 2, 3, 4, and 9 of our text. Tentative dates are listed below. Dates and assignments are subject to change at your professor's discretion.

Week 1: Aug. 25 – Aug. 31 • Syllabus • Enrollment Activity • Section 1.2 • Section 1.3 • Section 2.1	**Week 9:** Oct. 20 – Oct. 26 • Section 4.1 • Section 4.2
Week 2: Sept.1 – Sept. 7 • Section 2.2 • Section 2.3	**Week 10:** Oct. 27 – Nov. 2 • Section 4.3 • Section 4.4
Week 3: Sept. 8 – Sept. 14 • Section 2.4 • Section 2.5	**Week 11:** Nov. 3 – Nov. 9 • Section 4.5 • Section 4.6
Week 4: Sept. 15 – Sept. 21 • Section 2.6 • Section 2.7	**Week 12:** Nov. 10 – Nov. 16 • Section 4.7
Week 5: Sept. 22 – Sept. 28 • Section 2.8 • Section 2.9	**Week 13:** Nov. 17 – Nov. 23 • Section 4.8 • Section 4.9
Week 6: Sept. 29 – Oct. 5 • Section 2.10 • Assessment	**Week 14:** Nov. 24 – Nov. 30 • Section 4.10
Week 7: Oct. 6 – Oct. 12 • Section 3.1 • Section 3.2	**Week 15:** Dec. 1 – Dec. 7 • Section 9.1 • Assessment
Week 8: Oct. 13 – Oct. 19 • Section 3.3 • Application Project	**Week 16:** Dec. 8 – Dec. 14 • Section 9.2 • Section 9.3
	Finals Week: Dec. 15 – Dec. 19 • Thursday December 18, 12:00PM (noon)

Changes: The instructor reserves the right to amend, adjust, or otherwise modify the syllabus at any time during the course