Michigan Technological University
1885

Course Syllabus

MA5510 – Ordinary Differential Equations
College of Science and Arts, Fall 2025

Instructor Information

Instructor:	Allan, Struthers, PhD, Professor
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Office Hours:	MTWR 4–5pm and TR 2-3pm

Course Identification

Course Number:	MA5510 -R01
Course Name:	Ordinary Differential Equations
Course Location:	Fisher 130
Class Times:	TR 12:30–1:45pm
Prerequisites:	MA 4330 (Linear Algebra) or MA 4450 (Real Analysis) or equivalent

Course Description/Overview

Qualitative theory of solutions of ordinary differential equations, including existence, uniqueness, and continuous dependence; theory of linear equations; solution of constant coefficient systems; phase plane analysis; design and analysis of numerical methods.

Course Resources

Course Website(s)

- Canvas [www.courses.mtu.edu]
- GitHub https://github.com/AllanStruthersMTU

Course Texts/Software

- ODE for Scientists and Engineers by Struthers and Potter. Free from mtu accounts at https://link.springer.com/book/10.1007/978-3-030-20506-5
- Numerical Methods for DE by Dormand copies in my office and on library reserve..
- Numerical Methods for ODE by Butcher. Legal pdf at https://onlinelibrary.wiley.com/doi/book/10.1002/9781119121534
- Mathematica, free to MTU students from https://downloads.it.mtu.edu/
- Julia, freeware available from https://julialang.org/downloads/

Course Learning Objectives
Upon successful completion of this course, students will be able to

- Students will be prepared for the MTU ODE comprehensive exam
  https://www.mtu.edu/math/graduate/comprehensive-exam/archive/
- Be ready to teach several advanced topics to introductory ODE classes.
- Use, implement, and interpret numerical ODE solvers.

Grading System

Letter Grade	Percentage	Grade points/credit	Rating
A	90% & above	4.00	Excellent
AB	85% – 89%	3.50	Very good
B	80% – 84%	3.00	Good
BC	75% – 74%	2.50	Above average
C	70% – 7%	2.00	Average
CD	69.9% – 68%	1.50	Below average
D	60% - 65%	1.00	Inferior
F	59.9% and below	0.00	Failure
I	Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control.		
X	Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up by the close of the next semester or the grade becomes a failure (F). An X is included in the grade point average calculation as an F..		

Grades will be based on the following:

Course Component	Points
Homework	40
Projects/Exams	40
Canvas and Class participation	20
Total Points	**100**

Late Assignments

Deadlines are enforced because code and solutions are discussed in class.

Course Policies

- Attendance is important. Absences make it hard to keep a class on track.

- Ask questions in class—if something is unclear, others likely feel the same!

- Read material and do exercises before class.

- Maintain a respectful and professional learning environment.

- Collaboration and appropriate resource use on code/homework/presentations is encouraged. Not citing appropriately violates MTU Academic Integrity Policy 109-1

AI Policy

Transparency in GenAI tool usage is mandatory, and instructors reserve the right to ask students to explain their work process. This can include prompts and AI-generated output. GenAI changes fast. Course policies are provisional. If in doubt, consult the instructor..

Academic Integrity Rules

Students should discuss homework, code, and projects. Students are individually responsible for individual work. Groups are jointly responsible for group work. Resources used, including but not limited to internet sites, AI tools, etc should be cited. Please do not distract the instructor and other students during class. Maintaining academic standards is important, academic misconduct may result in an appropriate conduct sanction/educational condition(s) imposed by the Office of Academic and Community Conduct and/or in a faculty-imposed academic penalty. For details, review the policy [http://www.admin.mtu.edu/usenate/policies/p109-1.htm]

University Policies

As part of the university's commitment to curricular quality, student work products may be used to evaluate how well Michigan Tech students are achieving programmatic learning outcomes. Findings are used to inform future course and curricular improvements to support student learning but are not used to evaluate specific students and individual instructors.

Michigan Tech has standard policies on academic misconduct and complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. For more information about reasonable accommodations or equal access to education or services at Michigan Tech, please call the Dean of Students Office at 906-487-2212 or visit the Student Disability Services website [https://www.mtu.edu/success/disability/]. More information is also available from the Syllabi Policies webpage [http://www.mtu.edu/ctl/instructionalresources/syllabus/syllabus_policies.html].

Course Schedule

Student experience with prerequisites and interests will determine topics and sequencing. The final exam slot will be used for project presentations or an exam.

Week 1

T   *Syllabus review, introductions, and planning*
R   *Review of prerequisite materials*

Week 2

M   *9/1*   ***Labor Day, No class***
T/R   New Material
F   *9/5*   ***K-day recess begins at noon***

Week 3 and 4

T/R   New Material

Week 5

*T   9/23   **Career Fair Recess begins at 2 p.m.***
T/R   New Material

Week 6 and 7

T/R   New Material

Week 8

T   New Material
*W   10/15 **October Recess (begins at 10:00 p.m.)***
R   No Class

Week 9, 10, 11,and 12

T/R   New Material

Week 13

T/R   New Material
*F   11/21 **Fall Break begins at 10:00 p.m.***

Week 14

*M   12/1   **Instruction resumes***
T/R   Summary and big picture
*F   12/5   **Last Day of Instruction***

Finals Week   ***(12/8 – 12/12)***

Final exam as scheduled by the Registrar's office, schedule TBD.