

SYLLABUS Spring 2022

The University of Iowa
The College of Liberal Arts and Sciences
Department of Mathematics

Title of Course: MATH:2560:0092 Engineer Math IV: Differential Equations

Time/Days/Location: 8:30-9:20 MWF, 210 MLH

Instructor: Isabel Darcy

Office location and office hours: **25J MLH**

Office hours on Zoom: **10:30 – 11:30 am Tuesday, 9:30-11:30 am Thursday, or by appointment.**

Join URL: <https://uiowa.zoom.us/j/93367647694?pwd=Uk1ieFIwMVJqdDZSRjJ1dHdxNjhCdz09>

Phone and E-mail: 319-335-0770, isabel-darcy@uiowa.edu

Course Coordinator: Lihe Wang

Office location and office hours: **225B MLH, 12:30-1:20 MWF on zoom** Join

URL: <https://uiowa.zoom.us/j/98942043087>

Phone and e-mail: 335-3253, lihe-wang@uiowa.edu

DEO Contact Information: Weimin Han, 14 MLH, weimin-han@uiowa.edu

Prerequisites: (MATH:1560 or MATH:1860) and (MATH:2700 or MATH:2550)

MATH:2560:0092 8:30A - 9:20A MWF 210 MLH

MATH:2560:0121 9:30A - 10:20A MWF 210 MLH

MATH:2560:0102 2:30P - 3:20P MWF 14 SH

Some of the policies relating to this course (such as the drop deadline) are governed by its administrative home, the College of Liberal Arts and Sciences, 120 Schaeffer Hall.

Description of Course: Ordinary differential equations and applications; first-order equations; higher order linear equations; systems of linear equations, Laplace transforms, phase plane, stability.

Objectives and Goals of the Course: Be able to identify and solve the following types of differential equations:

1. First order linear equations including the method of integrating factors; Nonlinear equations, in particular separable equations.
2. Second order linear constant coefficient equations, both homogeneous and non-homogeneous. This includes methods of characteristic equations, undetermined coefficients, and variation of parameters.

3. Generalization of the techniques for second order to higher order linear constant coefficient equations, both homogeneous and non-homogeneous.
4. Laplace transform method, including solutions of second order problems with discontinuous forcing terms and impulse responses.
5. Systems of first order linear constant coefficient equations, both homogeneous and non-homogeneous. This includes solutions of homogeneous problems using eigenvalues.
6. Phase plane, stability.

Optional Text: Boyce and DiPrima: **Elementary Differential Equations and Boundary Value Problems**, 11th edition. Ebook will be available through Icon interactively as you do your homeworks.

- **Soft cover, ISBN: 978-1-119-37575-3**

You may also be able to bind a binder version and an e-book version. Check with the bookstore to see what is available. The big thing is that is the 11th edition. That way homeworks assigned will match up with what everyone else is doing.

All are available in the University Bookstore and Iowa Book and Supply; and hard cover by Amazon and many other possibilities for online purchases.

However, we will use WileyPlus to do the homeworks where e-book will be available.

MATERIAL TO BE COVERED: Boyce and DiPrima. Elementary Differential Equations and Boundary Value Problems. 11th Edition. Chapters 1-4, 6-7, 9(partially covered).

- Chapter1: (1.1-1.3) Introduction to differential equation: examples and basic concepts.
- Chapter2: (2.1-2.5, 2.7-2.8) First order equations and method of integrating factors for linear equations; Separable equations; Applications (in particular population dynamics). Existence and uniqueness theorems; autonomous equations, equilibrium and stability.
- Chapter3: (3.1-3.8) Theory of second order linear constant coefficient equations and applications. Characteristic equations; Existence and uniqueness theorems; Principle of superposition; linear dependence and independence; Wronskian; Reduction of orders; Undetermined coefficients and variation of parameters.
- Chapter4: (4.1-4.4) Higher order equations are covered briefly to extend the theory and methods of second order equations.
- Chapter6: (6.1-6.6) Laplace transform and Laplace transform method for solving linear initial value problems (IVPs) (in particular for IVP with discontinuous forcing terms and impulse responses).
- Chapter7: (7.1, 4, 5, 6, 7) Theory of first order linear systems with constant coefficients including real and complex eigenvalues.
- *Chapter9: (9.1-9.3) Phase plane, stability, and if time permits cover 9.3 for nonlinear theory.*

Grading System: Plus/minus grading will be used.

40%	2 midterms
35%	Final exam
10%	Quizzes bi-weekly, attendance and class participation
15%	Homework weekly

ALL EXAMS ARE COMPREHENSIVE unless specified otherwise.

Grade cuts and Grade Distribution: Two midterms and the final exam are going to be common exams for all sections, and the grades will be determined by the curve called Norm-Referenced Grading for intermediate level courses recommended by College of Liberal Arts and Sciences.

Calculators and other electronic devices are not allowed during the exams.

Midterm Exams:

MIDTERM 1: 6:30PM - 8:00PM 02/28/2022 Mon LR1 [VAN](#)

MIDTERM 2: 6:30PM - 8:00PM 04/11/2022 Mon LR1 [VAN](#)

Date and Time of the Final Exam:

The final examination date and time will be announced by the Registrar generally by the tenth day of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. Do not make your end of the semester travel plans until the final exam schedule is made public. It is the student's responsibility to know the date, time, and place of the final exam.

<http://registrar.uiowa.edu/final-exam-schedules>

TENTATIVE TIMETABLE

Week 1 January 17-21: Go over the syllabus. Sections 1.1-1.3

Week 2 January 24- 28: Sections 2.1-2.3

Week 3 January 31- February 4: Sections 2.4-2.5

Week 4 February 7-12 : Sections 2.7,2.8,3.1

Week 5 February 14-19: Sections 3.2-3.5;

Week 6 February 21- 25: Section 3.6, Review

Mid Term Exam 1: Chapters 1 and 2 and 3.1-3.5 Monday of the 7th week

Week 7 February 28- March 4: Sections 3.6, 3.7(MW 3.6-3.7)

Week 8 March 7-11: Sections 3.8, 4.1,4.2

Spring Break

Week 9 March 21-25: Sections 4.3,4.4,6.1

Week 10 March 28- April 1: Sections 6.2-6.4

Week 11 April 4-April 9, 6.5 and Review

Mid Term Exam 2: Chapters 3 and 4 and 6.1-6.4 Monday of the 12th week

Week12 April 11-15: Sections 6.6, 7.1, 7.4(HW 6.5-7.4)

Week13 April 18-22: Sections 7.5, 7.6, 7.7

Week 14 April 25-29: Sections 9.1, 9.2

Week 15 May 2-6: 9.3, Review

Final exam will be comprehensive

Course Policies:

Course attendance: Students are expected to attend every class. Absences may affect your grade.

Rules on Student Collaboration: In this class, students are allowed to talk with others about homework. **However, do not share your written work with others or ask others to see their completed assignments since both are considered academic misconduct.** In other words, you can discuss a problem with other students, but you write your solution alone. If you worked/discussed a problem with others, you must state their names on your homework before the beginning of that problem, even if you wrote the solution yourself. **HWs showing duplication will be considered as the result of academic**

dishonesty. If you need help, please stop by during my office hours. Students are responsible for understanding this policy; if you have questions, ask for clarification.

ATTENDANCE AND CLASSROOM EXPECTATIONS

Students are responsible for attending class and for knowing an instructor's attendance policies, which vary by course and content area. All students are expected to attend class and to contribute to its learning environment in part by complying with University policies and directives regarding appropriate classroom behavior or other matters.

ABSENCES

Students are responsible for communicating with instructors as soon they know that an absence might occur or as soon as possible in the case of an illness or an unavoidable circumstance. Students can use the CLAS absence form to help communicate with instructors who will decide if the absence is excused or unexcused; the form is located on ICON within the top banner under "Student Tools." Delays by students in communication with an instructor could result in a forfeit of what otherwise might be an excused absence (<https://clas.uiowa.edu/students/handbook/attendance-absences>).

ABSENCES: ILLNESS, UNAVOIDABLE CIRCUMSTANCES, AND UNIVERSITY SPONSORED ACTIVITIES

Students who are ill, in an unavoidable circumstance affecting academic work, or who miss class because of a University sponsored activity are allowed by UI policy to make up a missed exam. Documentation is required by the instructor except in the case of a brief illness. Students are responsible for communicating with instructors as soon as the absence is known (<https://opsmanual.uiowa.edu/students/absences-class#8.1>).

ABSENCES: HOLY DAYS

The University is prepared to make reasonable accommodations for students whose religious holy days coincide with their classroom assignments, test schedules, and classroom attendance expectations. Students must notify their instructors in writing of any such Religious Holy Day conflicts or absences within the first few days of the semester or session, and no later than the third week of the semester. If the conflict or absence will occur within the first three weeks of the semester, the student should notify the instructor as soon as possible. See [Operations Manual 8.2 Absences for Religious Holy Days](#) for additional information.

ABSENCES: MILITARY SERVICE OBLIGATIONS

Students absent from class due to U.S. veteran or U.S. military service obligations (including military service-related medical appointments, military orders, and National Guard Service obligations) must be excused without penalty. Instructors must make reasonable accommodations to allow students to make-up exams or other work. Students must communicate with their instructors about the expected possibility of missing class as soon as possible. (For more information, see <https://opsmanual.uiowa.edu/iv-8-absences-class%C2%A0-0>).

ACADEMIC MISCONDUCT

All undergraduates enrolled in courses offered by CLAS have in essence agreed to the College's Code of Academic Honesty. Academic misconduct affects a student's grade and is reported to the College which applies an additional sanction, such as suspension. Outcomes about misconduct are communicated through UI email (<https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code>).

ACADEMIC ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

The University is committed to providing an educational experience that is accessible to all students. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through [Student Disability Services](#) (SDS). SDS is responsible for making Letters of Accommodation (LOA) available to the student. The student must provide a LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated. The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Note that accommodations are not granted retroactively but from the time of the student's request to the instructor onward. Additional information can be found on the [SDS website](#).

CLASS RECORDINGS: PRIVACY AND SHARING

Course lectures and discussions are sometimes recorded or live-streamed. These are only available to students registered for the course and are the intellectual property of the faculty member. These materials may not be shared or reproduced

without the explicit written consent of the instructors. Students may not share these recordings with those who are not enrolled in the course; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and could be a violation of the Federal Education Rights and Privacy Act (FERPA); also see <https://dos.uiowa.edu/policies/code-of-student-life/>.

COMMUNICATION: UI EMAIL

Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community ([Operations Manual, III.15.2](#)). Emails should be respectful and brief, with complex matters addressed during the instructor's drop-in hours, for example. Faculty are not expected to answer email after business hours or during the weekends.

COMPLAINTS ABOUT ACADEMIC MATTERS

Students with a complaint about a grade or a related academic issue should first visit with the instructor and then with the course supervisor (if one is assigned), and next with the Chair of the department or program offering the course. If not resolved, students may bring their concerns to the College of Liberal Arts and Sciences:

<https://clas.uiowa.edu/students/handbook/student-rights-responsibilities>.

FINAL EXAMINATION POLICIES

The final exam schedule is published during the fifth week of the fall and spring semesters or on the first day of summer classes; *students are responsible for knowing the date, time, and place of their final exams*. Students should not make travel plans until knowing this information. A student with exams scheduled on the same day and time or who have more than two final exams on the same day should visit this page for how to resolve these problems by the given deadline: <https://registrar.uiowa.edu/makeup-final-examination-policies>. No exams may be scheduled the week before finals; some exception, however, have been made for labs, language courses, and off-cycle courses (<https://registrar.uiowa.edu/final-examination-scheduling-policies>).

FREE SPEECH AND EXPRESSION

The University of Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We are committed to open inquiry, vigorous debate, and creative expression inside and outside of the classroom. Visit Free Speech at Iowa for more information on the University's policies on free speech and academic freedom (<https://freespeech.uiowa.edu/>).

HOME OF THE COURSE

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the course's add and drop deadlines, the "second-grade only" option (SGO), and other undergraduate policies and procedures. Different UI colleges may have other policies or deadlines. See <https://clas.uiowa.edu/students/handbook>. Questions? Contact CLAS at clasps@uiowa.edu or 319-335-2633.

MENTAL HEALTH

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at: mentalhealth.uiowa.edu. Student Health can also address related concerns (<https://studenthealth.uiowa.edu/>). These visits are free to students. After hours, students are encouraged to call the Johnson County Community Crisis Line at (319) 351-0140 or dial 911 in an emergency.

NON-DISCRIMINATION STATEMENT

The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy, disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, associational preferences, or any other classification that deprives the person of consideration as an individual. The university also affirms its commitment to providing equal opportunities and equal access to university facilities. For additional information on nondiscrimination policies, contact the Director, [Office of Institutional Equity](#), the University of Iowa, 202 Jessup Hall, Iowa City, IA 52242-1316, 319-335-0705, oi-e-ui@uiowa.edu. Students may share their pronouns and chosen/preferred names in [MyUI](#), which is accessible to instructors and advisors.

SEXUAL HARASSMENT

The University of Iowa prohibits all forms of sexual harassment, sexual misconduct, and related retaliation. The [Policy on Sexual Harassment and Sexual Misconduct](#) governs actions by students, faculty, staff and visitors. Incidents of sexual harassment or sexual misconduct can be reported to the [Title IX and Gender Equity Office](#) or to the [Department of Public Safety](#). Students impacted by sexual harassment or sexual misconduct may be eligible for academic supportive measures and can learn more by [contacting the Title IX and Gender Equity Office](#). Information about confidential resources can be found [here](#). Watch the [video](#) for an explanation of these resources.