**SYLLABUS Fall 2019**

The University of Iowa

The College of Liberal Arts and Sciences

**Department of Mathematics**

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

**Time/Days/Location:**

**Section** [**0091**](https://myui.uiowa.edu/my-ui/courses/details.page?id=895507&ci=152067) 2:30P - 3:20P MWF 214 [MLH](http://maps.uiowa.edu/mlh)

**Instructor: Isabel Darcy**  
Office location and office hours: ***25J MLH, See course website***

Course website: homepage.divms.uiowa.edu/~idarcy/COURSES/100/FALL19/2560.html

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

**Course Supervisor: *Charles Frohman***Office location and office hours: ***225J MLH, 12:30-1:30 MWF or by appointment***  
Phone and e-mail: 335-2543, charles-frohman@uiowa.edu

**DEO Contact Information: Maggy Tomova**, 14 MLH, maggy-tomova@uiowa.edu

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

**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; 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. The method of Laplace transforms, 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.

**Required Text:** Boyce and DiPrima: Elementary Differential Equations and Boundary Value Problems, 11th edition.

* **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.**

*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, 7,8) Theory of first order linear systems with constant coefficients including real and complex eigenvalue*s.*
* *Chapter9: (9.1-9.2) Phase plane, and stability.*

**Grading System: Plus/minus grading will be used.**

40% 2 midterms

40% Final exam

15% Quizzes bi-weekly, attendance and class participation

5% 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.***

**EXAM DATES:**

**MIDTERM 1: Wednesday, October 2, 2019, 8:45-10:15pm,**  **AUD MH and or W10 PBB**

**MIDTERM 2: Wednesday, November 6 , 2019, 8:45-10:15pm, AUD MH and or W10 PBB**

**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 August 26-30:**  Go over syllabus. Sections 1.1-1.3, 2.1

**Week 2 September 2-6**: Sections 2.2-2.3

**Week 3 September 9-13**: Sections 2.4-2.5

**Week 4 September 16-20** : Sections 2.7,2.8,3.1

**Week 5 September 23-27**: Sections 3.2-3.4;

**Mid Term Exam 1: Chapters 1 and 2 and 3.1-3.4** Wednesday of the 6th week

**Week 6 September 30- October 4**: Review, Section 3.5

**Week 7 October 7-11**: Sections 3.6, 3.7

**Week 8 October 14-18**: Sections 3.8, 4.1,4.2

**Week 9 October 21-25**: Sections 4.3,4.4,6.1

**Week 10 October 28-November 1**: Sections 6.2-6.4;

**Mid Term Exam 2: Chapters 3 and 4 and 6.1,6.2** Wed of the 11th week

**Week 11 November 4-8**: Review Section 6.5

**Week12 November 11-15**: Sections 6.6, 7.1, 7.4

**Week13 November 18-22**: Sections 7.5, 7.6, 7.7,7.8

Thanksgiving Break

**Week 14 December 2-6**: Sections 9.1, 9.2

**Week 15 December 9-13**: 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.***

**College of Liberal Arts and Sciences Information and Policies for Undergraduates**

**Absences and Attendance**

Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing the absence policies for their courses, which will vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, unavoidable circumstances, or University authorized activities (https://clas.uiowa.edu/students/handbook/attendance-absences). Students may use this absence form to communicate with instructors: https://clas.uiowa.edu/sites/default/files/ABSENCE%20EXPLANATION%20FORM2019.pdf

**Academic Integrity**

All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty. Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through the UI email address (https://clas.uiowa.edu/students/handbook/academic- fraud-honor-code).

**Accommodations for Disabilities**

UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at https://sds.studentlife.uiowa.edu/.

**Administrative Home of the Course**

The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other colleges may have different policies. CLAS policies may be found here: https://clas.uiowa.edu/students/handbook.

**Communication and the Required Use of UI Email**

Students are responsible for official correspondences sent to the UI email address (uiowa.edu) and must use this address for all communication within UI (Operations Manual, III.15.2).

**Complaints**

Students with a complaint about a course should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to CLAS in 120 Schaeffer Hall. For more information, see https://clas.uiowa.edu/students/handbook/student-rights-responsibilities.

**Final Examination Policies**

The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals. Visit https://registrar.uiowa.edu/final-examination-scheduling-policies.

**Nondiscrimination in the Classroom**

UI is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity (diversity.uiowa.edu).

**Sexual Harassment**

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see https://osmrc.uiowa.edu/.