**Spring 2016**

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: 1:30- 2:20 MWF 214 MLH**

**Instructor: *Isabel Darcy***Office location and office hours: ***B1H MLH (see course website for hours)***
Phone and e-mail: **335-0778,** **isabel-darcy@uiowa.edu**

**Course website: http://homepage.divms.uiowa.edu/~idarcy/COURSES/100/SPRING15/2560.html**

**DEO Contact Information:** Dan Anderson, 14 MLH, dan-anderson@uiowa.edu

**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.**

**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.

**Required Text:** Boyce and DiPrima: Elementary Differential Equations and Boundary Value Problems, 10th edition. One can acquire the main textbook by one of the following three ways:

* **Hard cover, ISBN: 978-0-470-45831-0**
* **E-book, ISBN: 978-1-118-54397-9**
* **Binder version, ISBN: 978-0-118-15738-1**

**Optional Text:** Student Solutions Manual for Elementary Differential Equations and Boundary Value Problems, by Boyce and DiPrima, 10th edition: **ISBN: 978-0-470-45833-4**

**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. 10Th Edition. Chapters 1-4, 6-7.*

* 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: (7.1-7.9) Theory of first order linear systems with constant coefficients including real and complex eigenvalue*s.*

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

 40% 2 midterms

 30% Final exam

 10% Quizzes, attendance and class participation

 20% Homework

**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 they will be dtermined following the grade distribution for intermediate level courses recommended by College of Liberal Arts and Sciences as much as possible.***

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

**EXAM DATES:**

**MIDTERM 1: Wednesday, February 24, 2016, 6:30-8:00pm , VAN LR1**

**MIDTERM 2: Wednesday, April 6, 2016, 6:30-8:00pm, VAN LR1**

**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 (Subject to be adjusted during the semester):**

**Week1:**  Go over syllabus. Sections 1.1-1.3, 2.1

**Week2**: Sections 2.2-2.3

**Week3**: Sections 2.4-2.5

**Week4**: Sections 2.7-2.8

**Week5**: Sections 3.1-3.3; Review

**Mid Term Exam 1: Chapters 1 and 2 and 3.1.** Wed of the 6th week

**Week6**: Sections 3.4, 3.5

**Week7**: Sections 3.6, 3.7

**Week8**: Sections 3.8, 4.1

Spring Break

**Week9**: Sections 4.2-4.4

**Week10**: Sections 6.1-6.3; Review

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

**Week11**: Sections 6.4, 6.5

**Week12**: Sections 6.6, 7.1, 7.4

**Week13**: Sections 7.5, 7.6

**Week14**: Sections 7.7, 7.8

**Week15**: Section 7.9, 9.1 and 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.***

**Resources for Students:**
Students will find the Writing Center and the Speaking Center very useful for this course:
Writing Center: <http://www.uiowa.edu/~writingc/>
Speaking Center: <http://clas.uiowa.edu/rhetoric/for-students/speaking-center>

**Teaching Policies & Resources**

**Syllabus Insert**

**Administrative Home**

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at <http://clas.uiowa.edu/students/handbook>.

**Electronic Communication**

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences ([Operations Manual, III.15.2](http://www.uiowa.edu/~our/opmanual/iii/15.htm#152), k.11).

**Accommodations for Disabilities**

A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. See [www.uiowa.edu/~sds/](http://www.uiowa.edu/~sds/) for more information.

**Academic Honesty**

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's [Code of Academic Honesty](http://clas.uiowa.edu/students/handbook/academic-fraud-honor-code): "I pledge to do my own academic work and to excel to the best of my abilities, upholding the [IOWA Challenge](http://thechallenge.uiowa.edu/). I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled ([CLAS Academic Policies Handbook](http://clas.uiowa.edu/students/handbook)).

**CLAS Final Examination Policies**

The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week 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. It is the student's responsibility to know the date, time, and place of a final exam.

**Making a Suggestion or a Complaint**

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS [Academic Policies Handbook](http://clas.uiowa.edu/students/handbook)).

**Understanding 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 have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI [Comprehensive Guide on Sexual Harassment](http://www.sexualharassment.uiowa.edu/) for assistance, definitions, and the full University policy.

**Reacting Safely to Severe Weather**

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the [Department of Public Safety website](http://police.uiowa.edu/stay-informed/emergency-communication/).