Title of Course: Introduction to Ordinary Differential Equations MATH: 3600:0001  
Course meeting time and place: 3:30P - 4:20P MWF 210 MLH  
Department of Mathematics: [https://math.uiowa.edu/](https://math.uiowa.edu/)  

Course ICON site: To access the course site, log into [Iowa Courses Online (ICON)](https://icon.uiowa.edu/index.shtml) using your Hawk ID and password.  

Course Home  
The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the “second-grade only” option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.  

Instructor: Seungjin Ryu  
Office location: 325F MLH  
Student drop-in hours 10:30-11:20 MWF or by appointment  
E-mail: seungjin-ryu@uiowa.edu  

DEO Contact Information: Professor Ryan Kinser, 14 MLH, ryan-kinser@uiowa.edu  

Course Supervisor For this course, see the DEO.  

Description of Course  
Topics include first-order ordinary differential equations, second-order linear differential equations, series solutions, higher order linear and matrix differential equations, and existence and uniqueness theorems. Optional Topics: Introduction to basic PDE or Laplace Transforms. Not recommended for students who have taken MATH:2560, since there is considerable overlap. Requirements include in-class exams and a comprehensive final exam; homework involving problem solving is emphasized. Quizzes and/or homework may be collected.  

Learning Objectives: Students are expected to be able to identify and solve the following types of differential equations:  
- first order linear equations including the method of integrating factors; non-linear equations, in particular separable equations and autonomous equations, exact equations  
- second order linear constant coefficient equations, both homogeneous and non-homogeneous using the methods of characteristic equations, undetermined coefficients, and variation of parameters  
- generalization of the techniques developed for second order to higher order linear constant coefficient equations, both homogeneous and non-homogeneous
- series solutions, near ordinary or singular points
- systems of first order linear constant coefficient equations, both homogeneous and non-homogeneous; this includes solutions of homogeneous equations using eigenvalues
- phase plane, autonomous systems, and stability, examples

(If time permits) Laplace transform method for solving initial values problems, including solutions of second order equations with discontinuous forcing terms and impulse responses


Your e-textbook will be provided through ICON Direct and WileyPlus. See [https://teach.uiowa.edu/icon-direct](https://teach.uiowa.edu/icon-direct). First to do is to go to the ICON page of your course. You can also start with the video: [First Day of Class Video for Math 3600 Students in Canvas](https://teach.uiowa.edu/icon-direct) from Wiley.

**Tentative Timetable and Material to be covered:** *Boyce and DiPrima. Elementary Differential Equations and Boundary Value Problems. 12th Edition. Chapters 1-4, 5, 7, 9, 6 (some chapters are partially covered).*

- **Week 1** Chapter 1: (1.1 - 1.3) Introduction to differential equation: examples and basic concepts.
- **Weeks 2-4** Chapter 2: (2.1 - 2.8) First order equations and method of integrating factors for linear equations; Separable equations; Modeling with differential equations and applications (in particular population dynamics); Existence and uniqueness theorems; Autonomous equations, equilibrium, and stability
- **Weeks 5-8** Chapter 3: (3.1 - 3.8) Theory of second order linear differential equations with constant and non-constant coefficients; Characteristic equations; Existence and uniqueness theorems; Principle of superposition; Linear dependence and independence; Wronskian; Reduction of orders; Methods of undetermined coefficients and variation of parameters; Applications of second order equations to mechanical and electrical vibrations.
- **Week 9** Chapter 4: (4.1 - 4.4) Higher order equations are covered to extend the theory and methods of second order equations.
- **Weeks 10-12** Chapter 5: (5.1-5.4) Series solutions of second order linear equations, near ordinary and singular points
- **Weeks 13-14** Chapter 7: (7.1, 7.4 – 7.8) Theory of first order linear systems with constant coefficients including real and complex eigenvalues.
- **Week 15** Chapter 9: (9.1 - 9.2, possibly 9.4, 9.5 if time permits) Phase plane and stability.
- **Week 15** Chapter 6: (6.1 - 6.6, if time permits) Laplace transform and Laplace transform method for solving initial value problems (IVPs), in particular for IVP with discontinuous forcing terms and impulse responses.
Grades: Plus/minus grading will be used. Final course grades will be assessed based on your performance in the following activities:

- **20%** Midterm 1: Friday, 02/24/2023, In Class
- **20%** Midterm 2: Friday, 04/07/2023, In Class
- **30%** Final exam (Time and place TBA)
- **15%** Weekly Homework, assigned by Wednesdays, and usually due the following Wednesday
- **15%** Bi-weekly Quizzes, on Fridays, tentatively

No late homework or quiz, but two lowest HW scores and one lowest Quiz score will be dropped.

ALL EXAMS ARE COMPREHENSIVE, unless specified otherwise.

IMPORTANT: All midterms and the final exam are on paper and scheduled in a classroom.

Date and Time of the Final Exam
The final examination date and time will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to Registrar's final exam policy, students have a maximum of two weeks after the announced final exam schedule to request a change if an exam conflict exists or if a student has more than two exams in one day (see the policy here).

Academic Honesty and Misconduct
All students in CLAS courses are expected to abide by the CLAS Code of Academic Honesty. Undergraduate academic misconduct must be reported by instructors to CLAS according to these procedures. Graduate academic misconduct must be reported to the Graduate College according to Section F of the Graduate College Manual.

Student Complaints
Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact CLAS Undergraduate Programs for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS Associate Dean for Graduate Education and Outreach and Engagement when additional support is needed.

Drop Deadline for this Course
You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course here. **When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA.** Directions for adding or dropping a course and other
registration changes can be found on the Registrar’s website. Undergraduate students can find policies on dropping and withdrawing here.

College of Liberal Arts and Sciences (CLAS) Course Policies

**Attendance and Absences**

- **Course Attendance**: Students are expected to attend lectures and do all of the homework regularly. Students are responsible for everything covered in the lectures, textbook, and the prerequisites. Important announcements about changes (if necessary) to the syllabus, homework, exams, etc. will be done in the lectures or they will be posted on ICON. *University regulations require that students be allowed to make up examinations which have been missed due to illness or other unavoidable circumstances. Students with mandatory religious obligations or UI authorized activities must discuss their absences with me as soon as possible. Religious obligations must be communicated within the first three weeks of classes.*

- **Exam Policy**: Taking all quizzes and the three exams (midterms and final) is mandatory. In the exams, you are expected to show all of your work in an organized and coherent fashion. In the long problems, all work must be shown, and giving only a final solution obtained by guessing or using a calculator may not earn full credit. *Make-ups may be given for the exams missed due to unavoidable circumstances and compelling reasons which are documented in writing. If you have a conflict or a medical reason, discuss your situation with your lecturer as soon as possible.*

**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.

**Where to Get Help**

There is no TA for this course and help is not available through the Math Tutorial Lab. You are strongly encouraged to go to your lecturer’s office hours for additional help as needed. If you have conflicts with the listed office hours, make an appointment for additional office hours.

**University Policies**

- [Accommodations for Students with Disabilities](#)
- [Basic Needs and Support for Students](#)
- [Classroom Expectations](#)
- [Exam Make-up Owing to Absence](#)
- [Free Speech and Expression](#)
- [Mental Health](#)
- [Military Service Obligations](#)
- [Non-discrimination](#)
- [Religious Holy Days](#)
- [Sexual Harassment/Misconduct and Supportive Measures](#)
Sharing of Class Recordings