SYLLABUS, Math 2560, Differential Equations, Spring 2024

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 and Location: 12:30PM-1:20PM, C125PBB, MWF.
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: Victor Camillo, co-ordinator.

Office location 1E MLH office hours: 1:30-2:20 MWF**,**or **by appointment.** **On Zoom**: **Personal meeting room id: 861 420 1939**

Email: victor-camillo@uiowa.edu

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

TEXTBOOK: *The ICON Direct program will be used to provide required course materials via your ICON course site.*

Your U-Bill will be charged automatically after your course has started, unless you opt out prior to the last day for tuition and fee reduction course deadline . Specific opt out information will be provided in the course syllabus and in the opt out tool .

Text: Elementary Differential Equations And Boundary Value Problems Wileyplus Ecommerce Single Term Required ISBN: 978EEGRP44029Author: William E. Boyce Richard C. DiPrima Douglas B. MeadePublisher: Wiley ©2022

Approximately $57.24 will be billed to your U-Bill

MATERIAL TO BE COVERED: Boyce and DiPrima. Elementary Differential Equations and Boundary Value Problems. 12Th Edition. Chapters 1-4, 6-7, 9(partially covered).

- Chapter1: (1.1-1.3) Introduction to differential equations: 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 order; 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 Distribution:
50% 2 midterms
25% Final exam
8% Quizzes bi-weekly,
15% Homework weekly
2% Surprise Online Quizzes

Two midterms and the final exam are common exams for all sections.

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

Minimum for grade
A---90
A- 88
B+ 86
B 80
B- 78
C+ 76
C 60
C- 56
D+ 54
D 50
D- 48

Midterm Exams:
MIDTERM 1, 2/29/2024 100 Phillips Hall, 6:30-8:30
MIDTERM 2, 4/15/2024 100 Phillips Hall, 6:30-8:30

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). It is the student's responsibility to know the date, time, and place of the final exam.

TENTATIVE TIMETABLE

Week 1, 01/15: Go over the syllabus. Sections 1.1-1.3
Week 2, 01/22: Sections 2.1-2.3 quiz1
Week 3, 01/29: Sections 2.4-2.5
Week 4, 02/05 : Sections 2.7,2.8, 3.1 quiz2
Week 5, 02/12: Sections 3.2-3.5
Week 6, 02/19: Sections 3.5, 3.7, 3.8 quiz3
Week 7, 02/26: Review, catch up, Feb 29, Exam 1 100 PH

Week 8, 03/04: Sections 3.8, 4.1,4.2, 4.3
Spring Break
Week 9, 03/18: Sections 4.3,3.6, 4.4,6.1 quiz4
Week 10, 03/25: Sections 6.2-6.4
Week 11, 04/01 : Sections 6.5 6.6, 7.1 quiz 5
Week12, 04/08: Sections, 7.4 7.5, 7.6, 7.7
Week13, 04/15: Sections 9.1, 9.2,quiz 6
Week 14, 04/22: Review, catch up, Exam 2 100PH

Week 15, 04/29: 9.3 (optional), Review

The final exam will be comprehensive

ATTENDANCE AND CLASSROOM EXPECTATIONS

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.

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.

Rules on Student Collaboration:

In this class, students are allowed to talk with others about homework. In other words, you can discuss a problem with other students, but you write your solution alone. 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.

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. Graduate students should adhere to the academic deadlines and policies set by the Graduate College

Further information may be found on the web page University course polices and resources for students:

https://provost.uiowa.edu/student-course-policies

Where to Get Help (in addition to office hours):

• Math Tutorial Lab: https://math.uiowa.edu/math-tutorial-lab

• Engineering Tutoring: https://engineering.uiowa.edu/current-students/academic-support-and- tutoring/engineering-tutoring

• Tutor Iowa: https://tutor.uiowa.edu/

• Math Platoon (for military-connected students): https://math.uiowa.edu/diversity-and-outreach/math-platoon

• Other tutoring resources: https://math.uiowa.edu/math-tutorial-lab/other-tutoring-resources

College of Liberal Arts and Sciences (CLAS) Course Policies

Attendance and Absences

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.

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.