👉 Syllabus II: Schedule of Lectures, Reading and Homework.

Reading:

- The reading (and homework) are assigned from the course textbook: _**Elementary Differential Equations**_ **(https://canvas.ucsc.edu/courses/74265/files/9319879?wrap=1)** ↓ **(https://canvas.ucsc.edu/courses/74265/files/9319879/download?download_frd=1)** .
- You should read the assigned sections before the corresponding lecture.
  - We have a lot of material to cover in 10 weeks.
  - The lectures move quickly, and are prepared based on the assumption that you read the assigned sections ahead of time.
  - _If you don't read ahead, you may find the lectures difficult to follow._
  - You should read the sections again after the lecture, and work on the homework.
- It would also be good to read all of the appropriate sections again before each exam.

Homework:

- Homework is assigned generously.
  - 👉 **None** of it is collected or graded.
  - The more you do, the more you learn. 👈
- The TAs will review selected homework problems in their discussion sections.
- Homework problems are an excellent source for questions and answers in the weekly Canvas discussions.
- Doing homework is an excellent way to prepare for Exams.
- **Important**:
  - We don't expect you to finish each homework assignment in a day.
  - Some of the problems have multiple exercises of the same kind, and you should do enough of them to feel proficient.
  - You can think of the phrase "prove that... ", as "explain why...". These problems are important for understanding the concepts.
  - Make a note of the problems you don't know how to do, and ask (me, TAs, tutors, etc..) for help with them.
- The HW problems marked with a C/G are meant to be done (or partially done) using computer software, e.g., Matlab.

Exam dates: Are marked in **red**, as reminders.

Week 1

Monday, 7/29/24: Introduction; Examples; Direction fields (with Matlab); Linear first order equations.

- Reading: Chapter 1, Section 2.1
- Homework**.**
  - 1.2: 1, 4, 5, 6, 7, 9, 10.
  - 1.3: 1 - 11.

Wednesday, 7/31/24: Linear and separable first order equations.

- Reading. Sections 2.1 and 2.2.
- Homework.
  - 2.1: 3, 5, 6, 9, 10, 13, 17, 22, 31, 33, 39, 43, 45, 47.
  - 2.2: 1, 3, 6, 11, 12, 17, 19, 25, 27, 28, 29, 31, 33.

Friday, 8/2/24: Existence and uniqueness; Bernoulli equations; Exact equations.

- Reading. Sections 2.3 – 2.5.
- Homework.
  - 2.3: 1, 3, 7, 14, 17, 19.
  - 2.4: 1, 3, 7, 10, 15, 23,
  - 2.5: 1 – 11 (odd), 19, 21, 29, 33.

Week 2

Monday, 8/5/24: Applications.

- Reading. Sections 4.1 – 4.3.
- Homework.
  - 4.1: 1, 3, 11, 15, 17, 22, 23.
  - 4.2: 1, 4, 6, 9, 13, 17, 19.
  - 4.3: 1, 5, 8, 14, 17.

Wednesday, 8/7/24: Numerical methods

- Reading. Chapter 3
- Homework.
  - 3.1: 1, 3, 7, 11, 15. (Comment: Try writing a Matlab script that does the work on these problems for you)
  - 3.2: 1, 3, 7, 11, 15. (Comment: Try writing a Matlab script that does the work on these problems for you)
  - 3.3: 1, 3, 7 (Comment: Use the ode45 in Matlab to do these.

Friday, 8/9/24: Second order linear equations, I.

- Reading. Sections 5.1 – 5.2

- Homework.
  - 5.1: 1, 2, 3, 6, 7, 9, 11, 15, 27, 31, 37.
  - 5.2: 1, 3, 4, 5, 11, 15, 22, 23, 25.

Midterm 1 on Canvas: Opens at 9:00 am on Saturday, 8/10; Closes at 11:59 pm on Sunday, 8/11.

Week 3

Monday, 8/12/24: Second order linear equations, II.

- Reading: Section 5.3 – 5.5.
  - 5.3: 1, 2, 3, 6, 9, 13, 17, 21, 24, 27.
  - 5.4: 1, 5, 7, 15, 18, 21 (graphing optional), 26, 31, 33.
  - 5.5: 1, 3, 10, 19, 23.

Wednesday, 8/14/24: Non homogeneous second order linear equations, II.

- Reading. Sections 5.5 – 5.7
- Homework.
  - 5.5: 5, 9, 17 😬 , 25, 29, 32.
  - 5.6: 4, 5, 31,
  - 5.7: 1, 3, 5, 7, 24, 31

Friday, 8/16/24: Springs and circuits.

- Reading. Sections 6.1 – 6.3.
- Homework.
  - 6.1: 1, 3, 6, 9, 14, 15.
  - 6.2: 1, 7, 13, 21, 23, 26.
  - 6.3: 1, 3, 7.

Week 4

Monday, 8/19/24: The Laplace Transform, I

- Reading. Sections 8.1 – 8.3.
- Homework.
  - 8.1: 1, 2, 5, 8, 12 ("prove" means use the hint, and see what happens), 16.
  - 8.2: 1, 2, 3, 7.
  - 8.3: 1, 3, 9, 17.

Wednesday, 8/21/24: The Laplace Transform, II

- Reading. Sections 8.3 – 8.5.
- Homework.
  - 8.3: 21, 27, 35.
  - 8.4: 1, 5, 7, 11, 15, 19, 24.
  - 8.5: 1, 5, 7, 15, 17.

Friday, 8/23/24: Higher order linear equations; Systems of first order, linear equations.

- Reading. Sections 9.1, 9.2, 10.1, 10.2.
- Homework.
  - 9.1: 2, 3, 6(a, b), 7, 9.
  - 9.2: 1, 5, 11, 15.
  - 10.1: 1, 2, 3, 5.
  - 10.2: 1, 3, 5, 6, 8(a, c, f).

Midterm 2 on Canvas: Opens at 9:00 am on Saturday, 8/24; Closes at 11:59 pm on Sunday, 8/25.

Week 5

Monday, 8/26/24: Systems of first order, linear equations, II.

- Reading. Sections 10.3 – 10.5
- Homework.
  - 10.3: 6, 7, 8, 9, 10, 11 (you can use 6, without proving it).
  - 10.4: 1, 3, 7, 17, 19.
  - 10.5: 5, 7, 8.

Wednesday, 8/28/24: Systems of first order, linear equations, III.

- Reading. Sections 10.5 – 10.7; Supplementary Note on Matrix Exponentials.
- Homework.
  - 10.5: 13, 15, 17.
  - 10.6: 1, 3, 17, 19.
  - 10.7: 1, 3, 5, 11.

Final Exam: Friday, 8/30/24, 9:00 am – 12 noon, proctored on Zoom.