

MATH 20D, Introduction to Differential Equations

UC San Diego

COURSE SYLLABUS, WINTER 2023

Credit Hours: 4

Prerequisites: Math 20C (or equivalent); Math 18 is strongly recommended.

Catalog Description: Ordinary differential equations: exact, separable, and linear; constant coefficients, undetermined coefficients, variation of parameters. Series solutions. Systems, Laplace transforms. Computing symbolic and graphical solutions using Matlab.

Textbook: Fundamentals of Differential Equations (9th edition), by Nagle, Saff, and Snider. (Accessible through MyMathLab (mymathlab.com))

Attendance: Attending the lecture and the discussion session is a fundamental part of the course; you are responsible for all material presented in the lecture whether or not it is discussed in the textbook. You should expect questions on the exams that will test your understanding of concepts discussed in the lecture.

Instructor and Contact Information

Instructor: Kisun Lee

Office Hours: MW 4 - 5 pm and F 3:30 - 4:30 pm at APM 1260

E-mail: kil004@ucsd.edu

Course Websites

Course Information: <http://canvas.ucsd.edu>

On-line Discussions: <https://piazza.com/class/lckwegeb4bx3pj>

Course Description and Learning Outcomes

Course Title: Introduction to Differential Equations

Course Meeting Times: In-person lectures will be given on regular lecture times (**MWF 12:00-12:50 pm**). Students are encouraged to take part in this and ask questions to the instructor.

Teaching Assistants, Office Hours, and Meeting Locations:

<i>Sections</i>	<i>TA</i>	<i>Email Address</i>	<i>Recitation Location</i>	<i>Office Hours</i>
C01-C02	Qihao Ye	q8ye@ucsd.edu	APM 5402	Monday 4-6pm at APM 5720
C03-C06	Linhui Fu	l5fu@ucsd.edu	CENTR 218	Monday 2-5pm Tuesday 1-2pm at HSS 5012

Course Organization and Participation

This course will consist of lectures and recitations. You are required to attend all scheduled sessions at all times.

As your instructor, my role is to facilitate the lectures, coordinate with the teaching assistants to link lecture to recitation, provide you with ample assignments and assessments to gauge your understanding and knowledge of the subject matter, provide feedback on your performance, and be available for assistance when needed.

As students, you are expected to take your responsibility seriously, attend and participate in all of the class discussions, behave in a respectful manner to your instructor, TA, and fellow students at each class meeting, complete all assignments in a timely and professional manner, study the subject matter outside of class time, and ask for help when necessary.

Course Requirements and Grading

HOMEWORK: Homework will be assigned weekly with a due-date every Tuesday via MyMathLab. The lowest three homework items will be dropped. There will also be optional homework posted on Canvas in the Files tab. The optional homework will not be collected nor graded but is highly recommended for the preparation for exams.

MATLAB: There are four labs. Best 3 of 4 will be worth 6% of your grade (each 2%). There will be a Matlab quiz at the end of the quarter also worth 4% of your grade. All information on the Matlab component of the course can be found here: <http://www.math.ucsd.edu/~math20d/>.

Assignments	1. Introduction to MATLAB	Due at 11:59pm on Friday, January 20 PT
	2. Visualizing Solutions to ODEs	Due at 11:59pm on Friday, February 3 PT
	3. Numerical Methods	Due at 11:59pm on Friday, February 17 PT
	4. Systems of ODEs	Due at 11:59pm on Friday, March 3 PT

MIDTERMS: There will be two midterms (**50 minutes**) that will be done in person. Midterms are scheduled during the lecture time (**12:00 pm - 12:50 pm**).

FINAL: Final exam will be done in person. Details for the final will be given when the day is approaching.

Midterm 1 starts at 12 pm on February 1

Midterm 2 starts at 12 pm on March 1

Final Exam on March 22

You may not use any electronic devices (tablets, calculators, laptop, etc).

Make-up Exams: Make-up exams will not be given except for Covid-19 positive cases or official events that can be proven via a document.

Grading: 20% Homework, 10% Matlab, 20% Midterm Exam I, 20% Midterm Exam II, 30% Final Exam

There will be no curve, but we may adjust the scale to be more lenient (depending on the performance of the class).

*Letter grades will be determined based on the following intervals. **Do not expect any deviation from the following scale:***

A+	A	A-	B+	B	B-	C+	C	C-	D	F
[97,100]	[93,97)	[90,93)	[87,90)	[83,87)	[80,83)	[77,80)	[73,77)	[70,73)	[60,70)	[0,60)

The letter grades are assigned by Canvas automatically based on the numerical score. Letter grades are not negotiable. Please notice that outside factors, including the need for a certain grade for admission/retention in any academic program, scholarship or transfer credit, graduation requirements or personal desire for a specific grade DO NOT appear in the above calculations, and thus are not considered in any way in the determination of your course grade. Effort, improvement, class attendance and participation will all dramatically improve your grade in the course in that they will allow you to do well on quizzes and the final exam. They will not, however, actively participate in the calculation of your course grade.

Electronic computing devices: Graphing calculators and computer programs (or online computing websites such as Wolfram—Alpha <https://www.wolframalpha.com>) can be very helpful when working through your homework. However, a calculator/computer should be used as an aid in learning concepts, not just as a means of computation. You can use these devices when working on math problems, but always keep in mind that any answers you give must be accompanied by accurate justification.

Collaboration: You are allowed to discuss homework problems with your classmates. However, the final write-up of solutions should be your own work and reflect your own understanding of the problems. Copying or paraphrasing part of the solution to a homework problem from a classmate or from the internet is considered academic dishonesty.

Academic Integrity: According to the UCSD Policy on Integrity of Scholarship (<http://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2>), “no student shall engage in an activity that undermines academic integrity or facilitates academic integrity violations by others”. According to the policy, you are not allowed to:

- Complete, in part or in total, any assignment for another person.
- Have any of your course work be completed, in part or in total, by someone else.
- Plagiarize or copy even part of the work of another person or source and submit it as your own work.
- Employ aids excluded by the instructor in completing any assignment.
- Alter graded class assignments, then resubmit them for re-grading;

- Submit substantially the same material in more than one course without prior authorization; and misrepresent, to your instructor, any aspect of your academic work

Students caught cheating will face an administrative sanction which may include suspension or expulsion from the university.

Name and Gender Pronouns: UC San Diego is committed to supporting its students' name and gender preferences. Class rosters provided to your instructor and TAs have students' legal names, but we will strive to honor your request to be addressed using a preferred name or gender pronoun. Please let your instructor and TA know your preferences so that we can make changes to our records. (Certain university records may be beyond our ability to change, however.)

Equity, Inclusion, and Respect: We are committed to the UC San Diego Principles of Community (see <https://ucsd.edu/about/principles.html>). "To foster the best possible working and learning environment, UC San Diego strives to maintain a climate of fairness, cooperation, and professionalism. These principles of community are vital to the success of the University and the well being of its constituents." The principles of community include (but are not limited to):

"We affirm each individual's right to dignity and strive to maintain a climate of justice marked by mutual respect for each other." "We reject acts of discrimination based on race, ethnicity, sex, gender identity, age, disability, sexual orientation, religion, and political beliefs, and, we will confront and appropriately respond to such acts." "We promote open expression of our individuality and our diversity within the bounds of courtesy, sensitivity, confidentiality, and respect." "We are committed to promoting and supporting a community where all people can work and learn together in an atmosphere free of abusive or demeaning treatment." Visit the Office for Equity, Diversity, and Inclusion (at <https://diversity.ucsd.edu>) for more information.

Tentative Course Schedule

Please use this as an approximate class schedule; section coverage may change depending on the flow of the course.

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	Jan 9 1.1, 1.2		1.2, 1.3		2.2
2	Jan 16 MLK day (No class)	HW due	2.3, 2.4		2.5 Matlab HW due
3	Jan 23 4.2 discussion	HW due	4.2		4.3
4	Jan 30 Review discussion	HW due	Midterm 1		4.4 Matlab HW due
5	Feb 6 4.5 discussion	HW due	4.6		4.7
6	Feb 13 4.7 discussion	HW due	9.1, 9.3		9.4 Matlab HW due
7	Feb 21 Presidents' Day (No class)	HW due	9.5		9.6
8	Feb 27 Review discussion	HW due	Midterm 2		7.2 Matlab HW due
9	Mar 6 7.3 discussion	HW due	7.4		7.5
10	Mar 13 8.2 discussion	HW due	8.3		8.3

Recommended Problems : You are encouraged to work on all problems in the textbook and ask help for any question regarding to those problems. This list provides the minimum questions that is required to ensures the understanding of material. Some selected problems among these will be dealt on discussion session.

- **Section 1.1:** 2, 3, 4, 8, 16
- **Section 1.2:** 1, 4, 10, 24, 26
- **Section 1.3:** 2, 3, 6, 8
- **Section 2.2:** 3, 5, 9, 12, 16, 18, 26, 30
- **Section 2.3:** 3, 4, 12, 17, 25(a), 29
- **Section 2.4:** 4, 6, 10, 22, 29
- **Section 2.5:** 4, 7, 8, 9, 12
- **Section 4.2** 5, 10, 16, 19, 27, 30
- **Section 4.3:** 3, 6, 17, 24, 28
- **Section 4.4:** 4, 11, 14, 25, 28, 31
- **Section 4.5:** 1, 4, 18, 23, 25, 34
- **Section 4.6:** 3, 6, 9, 16
- **Section 4.7:** 3, 10, 11, 16, 26, 39, 42, 44
- **Review Problems Chapter 2:** 1, 2, 12, 23, 34, 35
- **Section 9.1:** 3, 4, 12
- **Section 9.3:** 9, 18, 22, 27, 31, 35
- **Section 9.4:** 2, 6, 9, 14, 22
- **Section 9.5:** 3, 9, 11, 12, 17, 19, 20, 26
- **Section 9.6:** 2, 6, 13(b)
- **Section 9.7:** 1, 2 (skip variation of Parameters)
- **Review Problems Chapter 4:** 6, 10, 13, 20, 25, 31
- **Section 7.2:** 4, 6, 11, 17, 23, 28 (Do not use integration tables. For 17, you can use the table of Laplace transform.)
- **Section 7.3:** 3, 7, 12, 16, 17, 21, 31
- **Section 7.4:** 9, 13, 22, 23, 27
- **Section 7.5:** 5, 7, 12, 23, 33
- **Section 7.6:** 2, 6, 14, 17, 22, 24, 31
- **Section 7.9:** 2, 19, 22, 23
- **Section 8.2:** 2, 3, 6, 8 (b)(e), 9, 29, 32
- **Section 8.3:** 2, 8, 14, 19, 23, 25, 26