

MATH 445: Mathematics of Physics and Engineering 2 (Spring 2024)

Lectures

Section 39665R: MWF 1-1:50 pm in KAP 414

Instructor: Pranava C Jayanti

Contact Info: pjayanti@usc.edu (Include "Math 445" in the subject line)

Office Hours: MW 11 am - 12:45 pm in KAP 416F (and also via Zoom)

<https://usc.zoom.us/j/92587312373?pwd=dmMxUE13eGRnYnFNcnJXMVVENUJJdz09>

Meeting ID: 925 8731 2373

Passcode: 360725

Discussion sessions

Section 39666R: TuTh 4-4:50 pm in SOS B41

Teaching Assistant: Siyang Liu

Office Hours: Tu 2-3 pm, Th 12-2 pm

Contact Info: liusiyan@usc.edu

Math Center

Your TA will hold office hours in the [Math Center](#) (located at KAP 263), from the second week of classes. You may visit the Math Center at any operational hour (Mon-Thu 8am-7pm, Fri 8am-5pm) and there will likely be someone there to help you.

Learning Objectives and Course Content

This course is, by nature, very applied (as opposed to abstract). The emphasis is on various techniques that are regularly used to solve partial differential equations (PDEs), including some indispensable properties of complex-valued functions. Most of the problems we will tackle will be inspired by mathematical descriptions of systems in physics and engineering. Seeing as most of you are from these disciplines, Math 445 will prove to be relevant and complementary to many of your other core courses.

We will discuss most of chapters 11 through 16 from the textbook (see below). This will include complex analysis (~9 weeks), Fourier series (~3 weeks), and PDEs (~3 weeks).

In some sense, this course is a sequel to MATH 245, which mostly focuses on ordinary differential equations (ODEs). However, you do not need to be familiar with the contents of 245 to do well here.

Prerequisites

MATH 226 or MATH 227 or MATH 229.

Textbook

The main source for the lectures is *Kreyszig, E. (2011) Advanced Engineering Mathematics 10th ed. John Wiley & Sons, Inc. (ISBN: 978-1-118-13036-0)*. If any other reference material is used, it will be provided during the course.

Course Notes

For the most part, we will closely follow the textbook, so there will not be any notes provided on a regular basis. If we cover any special material outside of the textbook, or if a certain topic deserves extra notes, I will upload them to Blackboard accordingly.

Communication

Announcements will be made in class and via Blackboard, so please check the latter regularly for notifications (or ensure that email notifications are switched on). The best way for you to contact me is via email or during the designated office hours.

Technological Proficiency and Hardware/Software Required

No softwares will be used in this course, except Blackboard and Gradescope. Zoom may be used in case I am traveling at any point of the semester.

USC Technology Support Links

[Zoom information for students](#)

[Blackboard help for students](#)

[Software available to USC Campus](#)

Additional online resources

- [Desmos](#): This is an online graphing calculator that you may find useful to visualize and manipulate functions.
- [Wolfram Alpha](#): This is an online computational engine that can perform various operations in calculus, linear algebra and much more.

Homework assignments

Homework will be assigned approximately once a week on Blackboard, and will usually consist of problems chosen from the textbook. All homeworks will count towards your final grade, so make sure you do not skip any!

You will have to scan and upload your solutions to Gradescope by the due date (or, you could also typeset them using LaTeX). The assignments will be graded in about a week.

Late work will not be tolerated unless there is a reasonable excuse (medical/religious/emergency). If you need an extension, please contact me about it ASAP. To maintain fairness, no extensions will be granted once homework solutions are posted on Blackboard.

Here's a tentative homework schedule (subject to change, if necessary):

Homework #	Date assigned	Date due	Sections covered
1	8th Jan	19th Jan	13.1 - 13.2
2	15th Jan	26th Jan	13.3 - 13.4
3	22nd Jan	2nd Feb	13.5 - 13.7
4	29th Jan	9th Feb	14.1 - 14.2
5	6th Feb	16th Feb	14.3 - 14.4
6	13th Feb	1st Mar	15.1 - 15.3
7	22nd Feb	8th Mar	15.3 - 15.4, 16.1
8	29th Feb	22nd Mar	16.2 - 16.4
9	18th Mar	5th Apr	11.1 - 11.5
10	28th Mar	12th Apr	11.6 - 11.9, 12.1

11	9th Apr	19th Apr	12.3 - 12.6
12	16th Apr	26th Apr	12.7 - 12.10

Midterm exams

There will be two in-class midterms (50 minutes each) conducted during the semester, tentatively on **Wednesday, February 21st 2024** and **Wednesday, March 27th 2024**. Both exams will be conducted during regular class hours, and the solutions will be posted to Blackboard afterwards.

Midterm - 1	Feb 21st 2024	Chapters 13, 14
Midterm - 2	Mar 27th 2024	Chapters 15, 16 (except 15.5)

For the midterm exams, you are NOT allowed cheat sheets/calculators. If you need to miss the midterm exams due to any planned absence, please let me know at the beginning of the semester.

Final exam

The end-of-semester exam will be conducted on **Wednesday, May 1st 2024 from 2 pm to 4 pm**. Please keep this date in mind. For the final exam, you are NOT allowed cheat sheets/calculators.

There are no makeups for the final exam. No student can take it earlier or later than the scheduled time. If the final exam poses a conflict with religious observances or any pre-planned activity, please contact me as early as possible. In certain situations, due to documented emergencies, students take an Incomplete (IN) grade. More information regarding policies for finals may be found [here](#).

Grading Breakdown

Mode of evaluation	Fraction of Grade
Homework	20%
Exams	80%

Total	100%
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The exam score of 80% will be calculated as the best of the following numbers:

- 20% Midterm-1 + 20% Midterm-2 + 40% Final
- 30% Midterm-1 + 50% Final
- 30% Midterm-2 + 50% Final

Missed midterm exams

For any unplanned absences, there will be no make-up exam. Your midterm will be scored as zero. (Please see the grading breakdown above for clarification.) If you miss both midterms, you will be recommended to drop the course, since the final will not be reweighted to account for both missed exams (one of your midterms will therefore be counted as an *actual zero*).

Grading Scale

Letter grades will be assigned at the end of the semester, after grading “on a curve” to account for averages that are lower than usual. These variations notwithstanding, a *very rough* estimate for the grades would be as follows – A for >90%, B for 80-90%, C for 70-80%, D for 60-70%, with pluses and minuses distributed appropriately.

Grading Disputes

Grading disputes in any form of assessments are to be resolved within 2 days of the homework/exam being returned to the student. No score adjustments will be entertained beyond this window of opportunity.

Important dates

Task	Deadline
Last day to add	Fri, Jan 26 th 2024
Last day to change to Pass/No Pass	
Last day to drop without a mark of "W" and receive a refund	
Last day to withdraw without a “W” on transcript or change pass/no pass to letter grade	Fri, Feb 23 rd 2024

Last day to drop with a mark of "W"	Fri, Apr 5 th 2024
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More details can be found [here](#).

Attendance

Lectures will be delivered in-person, and will not be streamed or recorded. As a matter of principle, I do not enforce attendance in my courses (you are all adults, and I shall treat you as such!). However, coming to lectures, paying attention, and actively participating with questions/comments is very strongly advised. This course moves at a fast pace, so it is easy to feel lost if you miss a few classes.

That being said, I will make every effort to help those with reasonable excuses. If you have to miss class due to religious observances during the semester, please let me know your schedule as early as possible in the semester, so that we can work to accommodate your absence. In case of medical reasons, please contact me via email as soon as it is possible for you to do so.

Course evaluation

Course evaluations at the end of the semester are a great way for me to receive feedback from you – this will help me improve my teaching, making it a better experience for both me and the next batch of students. Of course, you don't have to wait until the end of the semester for this. If you wish to contact me with any suggestions/requests during the semester, please do not hesitate to do so.

Course Schedule: A Weekly Breakdown

A tentative course schedule is as follows. It is subject to change throughout the semester, so please check it regularly and look out for alerts on Blackboard.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	1/8: Intro, 13.1	1/9: No discussion	1/10: 13.2	1/11: Discussion	1/12: 13.2, 13.3
Week 2	1/15: MLK Day	1/16: Discussion	1/17: 13.3	1/18: Discussion	1/19: 13.3, 13.4; HW-1

Week 3	1/22: 13.4, 13.5	1/23: Discussion	1/24: 13.5, 13.6	1/25: Discussion	1/26: 13.7; HW-2
Week 4	1/29: 14.1	1/30: Discussion	1/31: 14.1	2/1: Discussion	2/2: 14.2; HW-3
Week 5	2/5: 14.2	2/6: Discussion	2/7: 14.3, 14.4	2/8: Discussion	2/9: 14.4; HW-4
Week 6	2/12: 15.1	2/13: Discussion	2/14: 15.1	2/15: Discussion	2/16: 15.2; HW-5
Week 7	2/19: President's Day	2/20: Discussion	2/21: Midterm-1	2/22: 15.3	2/23: Discussion
Week 8	2/26: 15.4 (VIRTUAL)	2/27: Discussion	2/28: 16.1 (VIRTUAL)	2/29: Discussion	3/1: 16.1, 16.2; HW-6
Week 9	3/4: 16.2, 16.3	3/5: Discussion	3/6: 16.3, 16.4	3/7: Discussion	3/8: 16.4; HW-7
Week 10	SPRING BREAK				
Week 11	3/18: 11.1	3/19: Discussion	3/20: 11.2	3/21: Discussion	3/22: 11.3, 11.4; HW-8
Week 12	3/25: 11.5	3/26: Discussion	3/27: Midterm-2	3/28: Discussion	3/29: 11.6
Week 13	4/1: 11.7	4/2: Discussion	4/3: 11.8, 11.9	4/4: Discussion	4/5: 11.9; HW-9
Week 14	4/8: 12.1, 12.2	4/9: Discussion	4/10: 12.3	4/11: Discussion	4/12: 12.4, 12.5; HW-10

Week 15	4/15: 12.6	4/16: Discussion	4/17: 12.6, 12.7	4/18: Discussion	4/19: 12.7; HW-11
Week 16	4/22: 12.8	4/23: Discussion	4/24: 12.9	4/25: Discussion	4/26: 12.10; HW-12
Finals Week			5/1: Final Exam (2-4 pm)		

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

Students and Disability Accommodations

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems

- *Counseling and Mental Health - (213) 740-9355 – 24/7 on call*

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

- *National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

- *Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call*

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

- *Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086*

eeotix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

- *Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298*

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

- *The Office of Student Accessibility Services (OSAS) - (213) 740-0776*

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

- *USC Campus Support and Intervention - (213) 821-4710*

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

- *Diversity, Equity and Inclusion - (213) 740-2101*

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

- *USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

- *USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*

dps.usc.edu

Non-emergency assistance or information.

- *Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)*

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

- *Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu*

chan.usc.edu/otfp