Math 458, Numerical Methods
Spring 2024

Lectures: 39656, 11am – 12pm, WPH 103
Discussions: Register for ONE section below.
39657, 2pm – 3pm, GFS 223
39658, 3pm – 4pm, GFS 223

Instructor: Aykut Arslan
aarslan@usc.edu
Office: KAP 424B
Office hours (tentative): Monday-Wednesday 3:30 – 4:30 (in-person and online)
Thursday 4-5pm (online only), drop-in (subject to my availability), and by appointment

TA: Inga Girshfeld
girshfel@usc.edu
The TA will be holding consulting hours in the Math Center starting the second week of classes. You can go to the Math Center in-person (KAP 263) or access the Math Center zoom session by going to the Math Center website dornsife.usc.edu/mathcenter and clicking the link there. The TA hours will be posted starting the third week of classes but the Math Center will open the second week of classes on an ad-hoc basis.

Textbook: You are not required to purchase a textbook. The following texts are highly recommended for reference. I will be following Ascher and Greif quite closely.
- *A First Course in Numerical Methods*, by Uri Ascher and Chen Greif. We will attempt to cover at least chapters 1 – 6, 8, and 10 – 11. We'll cover chapters 14 and 15 if and as time permits. Unfortunately, I don't expect to have time to cover chapters 7, 9, 12, 13 and 16.
- *Numerical Computing with Matlab,* by Cleve Moler, available online at https://www.mathworks.com/moler/chapters.html.

Course Description: This class will be a survey of numerical mathematics and computing. My goals are to:

a) acquaint you with algorithms and the potentialities of using computers for solving numerical problems that arise in different applications of mathematics,
b) develop your understanding of the errors that arise in scientific computing and methods that are used to detect, predict, and control them,
c) acquaint you with some of the other issues surrounding numerical computations including efficiency of calculations and rates of convergence of numerical methods, and
d) give you the opportunity to hone your skills in computer programming and problem solving.

Graded Work:

- There will be roughly weekly homework, totaling approximately a dozen assignments. These will constitute 30% of your grade in the class. You can expect to need to use Matlab for some of these assignments.
- There will be two midterms; one on Friday February 16 th and the other on Friday March 22nd, both during class. These will each constitute 20% of your grade in the class.
- There will be a final exam on Wed May 1, 11am – 1pm. This will constitute 30% of your grade in the class.

Late Work and Illness:

- Each homework will have a due date and a late due date (usually about 12 hours after the due date). The late due date is simply to accommodate technology problems that may arise during submission, so assignments received by the late due date will receive full credit.
- If something happens the day of a midterm (you are sick or have a car accident, for example) then you should contact me ASAP. If I can make arrangements to have you take the assignment that day (perhaps over zoom) we'll do that. Otherwise, the default option will be to put extra weight on your final exam to account for the missing midterm exam.

Technology Platforms We'll be Using:

- **Blackboard:** blackboard.usc.edu
  This is where you'll access zoom links to the classes (should you choose to attend class over zoom), recordings of the lectures, and other handouts.
- **Gradescope:** gradescope.com
  This is where you will submit homework. You can access gradescope through a link on blackboard. When submitting written work on gradescope you should a) create a single pdf file of your work that you upload and b) tag the pages corresponding to each question as indicated in the outline.

Computers and Programming:
Numerical methods are methods for solving problems *on the computer*. Implementing the algorithms we learn on the computer will be an integral part of this course. I will expect you to do this using Matlab. The first 3 weeks of discussion will be primarily devoted to teaching you Matlab. If you are already comfortable using Matlab it would probably be safe to skip those sessions, though you may want to attend anyway as a refresher and to see some of the examples the TA does coding up algorithms we cover in class. When doing homework, you should think of Matlab as an available tool that you may use as and when appropriate. If you use it, you should explain what you did and provide your Matlab code. For assignments that are essentially centered on computing, you should upload the code.

In-person versus Remote Attendance and Class Recordings:
I am glad we are all in person but storms, fire, and infectious diseases are still an issue and we need to behave appropriately to keep each other safe. The TA and I will run all classes in hybrid mode and will record the classes. You may access the zoom sessions and class recordings on blackboard under USC Zoom Pro Meeting (then click on Cloud Recordings for the class recordings).

You may attend remotely if you wish and you *should* attend remotely if you don't feel well. However, I don't recommend remote attendance as a regular habit. It is much harder to stay connected with the class when you attend remotely and easier to fall behind. Furthermore, remote attendance is at your own risk; on the rare occasions when there are technological difficulties and you planned to attend remotely, you will be responsible for finding out what was covered that day and you may miss the opportunity to gain participation credit for that day.

Where to go for help:
If you are having difficulty with this class the sooner and more regularly you seek help the more effective that help will be. One of the best places to get help is from your fellow classmates. You are strongly encouraged to study and work on homework together. The next best place is to come to the my office hours or the TA's hours in the Math Center. The math department also provides the Math Center as an additional source of help. The Math Center is open M – Th, 8am – 7pm and F 8am – 5pm. You can go there to get help with a particular question or you can use it as a study room where you can get help as and when you need it. To reduce congestion in the physical space, the plan is to have the Math Center open both physically or virtually, so you can either go in person or access the online zoom session. To access the Math Center zoom session and to find out the schedule of the graduate assistants go to the Math Center website at http://dornsife.usc.edu/mathcenter. The Math Center opens the second week of classes. The schedule indicating when the TAs are there will start the third week of classes.

Academic Conduct:
I take academic dishonesty seriously and will report offenses. I encourage you to work together on homework and the daily quizzes, but simply copying someone else's work and, in particular, representing it as your own work, constitutes academic dishonesty. All work done during tests must be solely your own work.

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 scientific misconduct, policy.usc.edu/scientific-misconduct.

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 of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.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 of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services - (213) 740-0776
osas.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

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 at USC - (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](dps.usc.edu)
Non-emergency assistance or information.