Introduction to Numerical Analysis I

http://www.cse.psu.edu/~madduri/teaching/CMPSC455

Instructor. Prof. Kamesh Madduri, 343E IST Building, madduri at cse.psu.edu, 814-865-0883. Office hours: TR 9.30–11.00 AM (343E IST), or by appointment (madduri.org/cal).

Class Overview and Objectives. This class introduces students to key topics in numerical analysis, with emphasis on the computational mathematics behind numerical methods and on proving theorems. CMPSC/MATH 451 is a related course that has a significant overlap with topics studied in CMPSC/MATH 455 and CMPSC/MATH 456. Students may obtain credit for either this class or CMPSC/MATH 451, but not both.


Prerequisites. MATH 220. MATH 230 or MATH 231. Three credits of programming (CMPSC 201 or CMPSC 202 or CMPSC 121).


Class Material. All class presentations, lecture notes, and homework assignments will be posted on Penn State’s Angel CMS. Please send me email through Angel. We will also use Piazza for class discussions, announcements, and for clarifications regarding homeworks and exams.

Evaluation and Grading. The final grade will be based on five homeworks, two in-class midterm examinations, class attendance, and a comprehensive final exam.
Homeworks: 45%, Attendance: 5%
Midterm 1: 15%, Midterm 2: 15%
Final Exam (May 2, 12.20-2.10 pm, 102 CHEM): 20%

Please let me know as soon as possible if you will need to reschedule an exam, or have any special needs during the semester.

Homework Assignments. Most of the homeworks will be due one week after they have been handed out. Please submit them via Angel before the start of the class, or hand them over to me in class. Each homework will be worth 10 points, and I will assign a 50% weighting to the lowest score of the five homeworks. For instance, if your individual homework scores are 10, 10, 6, 10, and 10, your final homework grade will be 43 out of 45. Most of the homeworks will include problems that require MATLAB programming, and the code should be submitted electronically. Late homework submissions will generally not be accepted. Please contact me at least two days in advance in case you won’t be able to meet a deadline.
Attendance Policy. I strongly encourage students to attend all the lectures. Please let me know if you will be missing multiple classes for legitimate, unavoidable reasons. I will periodically take a roll call in class, and will use the aggregate attendance count for your 5% class attendance grade.

Schedule. Here is a tentative schedule (last updated April 18) of lectures, homeworks, and topics to be covered:

- Jan 8–Jan 22. Introduction, Error Analysis, Floating point arithmetic
- Jan 17–Jan 29. Homework #1
- Jan 22–Feb 5. Nonlinear equations in one variable
- Feb 5–Feb 12. Homework #2
- Feb 14. Midterm Exam 1 (covering material in Homeworks #1 and #2)
- Feb 19–Mar 19. Linear systems
- Mar 12–Mar 21. Homework #3
- Mar 19–Mar 28. Polynomial Interpolation
- Mar 28–Apr 2. Homework #4
- Apr 4. Midterm Exam 2 (covering material in Homeworks #3 and #4)
- Mar 28–Apr 9. Piecewise Polynomial Interpolation
- Apr 16–25. Homework #5
- Apr 11–Apr 23. Numerical Differentiation and Integration

Academic Integrity. Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others. Students must abide by the administrative policy for academic integrity (please see [http://www.psu.edu/oue/aappm/](http://www.psu.edu/oue/aappm/)).

Students should independently perform the homework assignments, and no collaboration is allowed (even with students of the other section). Avoid plagiarism ([http://tlt.its.psu.edu/plagiarism/tutorial](http://tlt.its.psu.edu/plagiarism/tutorial)), and please contact me first if you are in doubt. You can contact the TA if you have any questions about the homework assignments, and for getting started with the programming assignments.

Educational Equity. Penn State welcomes students with disabilities into the University’s educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at [http://equity.psu.edu/ods/](http://equity.psu.edu/ods/).

In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at [http://equity.psu.edu/ods/guidelines/documentation-guidelines](http://equity.psu.edu/ods/guidelines/documentation-guidelines)). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.