Introduction to Numerical Analysis (MATH 237) Fall 2018

Time: TTR 10:05-11:20am **Place**: Lafayette L411

Info: Professor Chris Danforth
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course tweets: @macheps237 please use #math237 also
course website: `http://www.uvm.edu/~cdanfort/main/237.html`
Office Hours: Usually Wednesday afternoons

Prerequisites: MATH 121 (Calculus III) or MATH 122 (Applied Linear Algebra) or MATH 124 (Linear Algebra) or 271 (Applied Math for Engineers and Scientists). Knowledge of computer programming.

Textbook: *Numerical Analysis* by Timothy Sauer, Addison Wesley.

References: *Introduction to Scientific Computing* by Charles F. van Loan, Prentice Hall.

Topics:

- Number Representation and Errors, Chapter 0 (2 lessons)
- Locating Roots of Equations, Chapter 1 (2 lessons)
- Numerical Interpolation and Splines, Chapter 3 (2 lessons)
- Numerical Differentiation and Integration, Chapter 5 (3 lessons)
- Linear Systems, Chapter 2 (6 lessons)
- Eigenvalues and Singular Values, Chapter 12 (2 lessons)
- Numerical Solution of Differential Equations, Chapter 6 (4 lessons)
- Least Squares, Chapter 4 (3 lessons)
- Monte Carlo Methods, Chapter 9 (1 lesson)
- Exams (2 lessons)

Grades: There will be 11 homework assignments (totaling 50% of your grade). For undergraduates, I will drop the lowest HW. There will be three midterm exams (totaling 50% of your grade) w/the final of these happening during the final exam slot 10:30am Dec 13. Class participation will play a role in determining your course grade if you're on a boundary. HW will typically consist of several book exercises and a programming assignment. If the due date arrives and you have completed the book exercises, but not the coding, hand in the work you have done. Late homework will be marked down 10% for each day late. Graduate students will also be required to engage in a project exploring applications of the course material in a recent research publication. Please meet with me early in the semester to discuss potential mechanisms for fulfilling this responsibility. For graduate students, the project grade will count as a fourth mid-term exam.

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Remarks:

- If you are a graduate student, you are required to submit your HW solutions using a mathematical document preparation software (e.g. LaTeX). If you are an undergraduate student planning on going to graduate school in the sciences, I strongly suggest you do so as well. Information about LaTeX can be found on the course website.
- We will use MATLAB (Matrix Laboratory) for all of our computational needs; please familiarize yourself with basic MATLAB commands. To get started learning matlab, I suggest you read Appendix B in your textbook, starting on page 609, with Matlab running on a computer in front of you. You can also click on the 'how do I use matlab' link on the course website, it points to a comprehensive set of instructional demonstration videos.
- The computer science department runs a MATLAB course titled CS21. **If you have no experience with MATLAB I strongly suggest that you consider taking this course**.
- Be careful when you use a calculator in this class. (1) You will not get to use them on exams. (2) Their precision is neither transparent nor consistent. (3) They will lie to you.
- I may convey important information to you via your UVM email account. If you do not use your firstname.lastname@uvm.edu account, please have mail from this account forwarded to an account you check frequently. Also, when emailing me, please include 237 in the subject line.
- Please bring your questions about the course material to office hours (make sure the question is important and can not be answered by a google search if you are going to send an email about it).
- Each student is required to visit my office hours at least once during the semester.
- Please bring your textbook to class with you every day.
- You are encouraged to work in groups on homework assignments. However, each student must turn in their own solutions and code.
- Offenses against academic integrity are any acts which would have the effect of unfairly promoting or enhancing one's academic standing within the entire community of learners. Such acts are serious offenses, which insult the integrity of the entire academic community of the University. Any suspected violations of the policy will not be tolerated and all allegations will be forwarded to the Center for Student Ethics & Standards.
- In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact ACCESS, the office of Disability Services on campus. ACCESS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated in an accommodation letter to faculty. All students are strongly encouraged to meet with their faculty to discuss the accommodations they plan to use in each course. Contact ACCESS: A170 Living/Learning Center; 802-656-7753; access@uvm.edu; or www.uvm.edu/access.
- UVM Religious Holidays Policy: Please submit in writing by the end of the second full week of classes your documented religious holiday schedule for the semester. Students who miss work for the purpose of religious observance will be permitted make up this work.