Math 463 Scientific Computing

3 credits

Instructor: Dr. Karen Braman
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Math Dept: M 308 (394-2471)

Lecture Hours: 11:00 – 11:50 am, MWF, M 213

Michael T. Heath

D2L Site: https://d2l.sdbor.edu/index.asp

Office Hours: 4:00pm-5:00pm, MTThF or by appointment.

Click here to see my schedule. Feel free to stop by my office at other times as well. If you’re having trouble finding me outside of class, talk to me just before or after class or send me an email. I will find a time that works for both of us!

Prerequisites: MATH 373 or CSC 372 or permission of instructor.

Course description: This course is an introduction to the elements of numerical analysis and modern scientific computing. The primary focus will be on the mathematical analysis of computational methods and the effective use of scientific computation as it relates to the needs of engineering and science. Topics will include: machine arithmetic and error analysis, the approximation of eigenvalues, and numerical solutions of ordinary differential equations. Additional topics in numerical analysis will be included as time permits. Specifically, we will cover Chapters 1 - 5, 7 and 9 and other topics as time permits.

Instructional Methods: This course will be primarily lecture/discussion.

Homework: There will be a collection of problems from each of the chapters stated above with due dates to be announced in class. Each assignment will include at least one programming problem. For some I may require use of Matlab/Octave and for others you will be able to choose from Matlab/Octave, Fortran, or C++. The total homework points for the semester will be ~300.

Exams: There will be three 100 point exams (Feb 20, Apr 3, and May 7).

Makeups: If you must miss an exam or hand in an assignment late for a legitimate reason AND you notify me before the exam/due date, I will gladly give you a makeup or waive the late penalty. **If you do not notify me ahead of time, I will not give you a makeup exam/assignment.** There are many ways to get a hold of me or leave a message (email, office phone, Math Dept phone) Do not expect to make up for missing assignments by doing extra work at the end of the semester.

Final Exam: The final, a.k.a. last, exam is scheduled for May 7th, 9:00 -10:50am. Please note that the department has a strict **No Early Finals** policy so make any travel plans accordingly.

Grading: Course grades will be determined according to the following percentage scale:

| 90-100 A | 80-89 B | 70-79 C | 60-69 D | 0-59 F |

It is possible that this standard may be lowered, but it will not be raised. In order to receive a grade of D or better, you must have at least a 60% average on the homework portion and on the exam portion.

Keys to Success: The keys to success are simple concepts, but are important enough to state.

- Attend and participate in class.
- Keep up with the homework and the lecture.
• Read the text. **Reading a math text is an active process!** Have pencil and paper with you -- write down definitions, work out the examples and 'Quick Exercises'. Be sure you understand every word.

• If you don’t understand something then **ask questions**; go to office hours.

• Set aside plenty of time to study for exams.

**Class rules:**

**What not to do....**

• Do not arrive late. It is best to have a seat by 5 minutes prior to the hour. Learn how long you’ll need to find parking and/or walk to class at the start of the semester.

• Do not leave early. Do not start to pack up your notes and books prior to 10 before the hour, unless we’re clearly finished with class early. Exceptions: if you let me know before class that you will need to leave, or you have a genuine emergency.

• Do not talk to other students in class while I’m lecturing. If someone else around you talks too much, please let me know!

• Do not attend to paperwork, homework, or other work that distracts from listening to the lecture.

• Do not eat or chew gum in class. Safely sealed drinks (e.g. coffee cups with lids or water bottles) are OK to bring.

• Do not read papers, listen to music or surf the web in class.

• Do not wear hats, caps, or sunglasses in class.

• Turn off mobile phones when in class. Nobody else wants to hear your phone. If a cell phone or other electronic device disrupts class, then the owner will **sacrifice their highest quiz score for each offense or pay a fine. The fine for electronic device disruption is the purchase of cookies/snacks for the entire class.** This happens to be similar to a policy used at the state legislature. Exceptions: if you must remain available for a child or other dependent, please let me know in advance, and get a phone with a silent vibrating call alert.

• Do not come to class if you are too tired, ill, injured, depressed, hung over, etc. to pay attention properly. Get your rest and stay healthy. Come to class well-fed with a decent meal that will not make you suffer a hypoglycemic blood sugar crash half-way through class. Your brain needs a good, steady supply of protein and complex carbohydrates. SDSMT is not free. Why waste the money by not getting much as you can out of lecture?

**What to do....**

• Be prepared. Read the text before class.

• Stay focused. Don’t bring in the other worries and distractions of life. You can’t solve them while you are in class, so you might as well focus.

• Be inquiring. Keep "what", "how" and "why" in your head and ask questions. Search for additional sources on the web.

• Follow a schedule. This will keep you consistent and reduce the pretest panic.

• Be proactive. Start on projects right when they are assigned, even if you are very busy. Organize a study group.

• Be alert. If you’ve read this, good for you! Send me an email with the words "I'm alert" in the subject line no later than Friday, Jan 23rd at midnight to receive 5 points. Be sure to include Math 463, your name and student ID number.

• Take notes. Decide before class start how you plan to do this. Get the supplies prior to class. Notes don’t have to be extensive to be useful. They are not a transcription of the lecture; but a short hand to remember the lecture. The text contains the details, so sparse notes allow for thinking during the lecture.

• Take care of yourself. Exercise and real food [not fast or fried food] will make a difference in long term performance.

**Academic Honesty and Integrity:** All students will be held to the institutional standard for academic honesty and integrity. The following are the relevant sections taken from the student handbook (SD Policies and Procedures):

**Acts of academic dishonesty will include, but are not limited to, the following:**

• **Cheating**, which is defined as, but not limited to, the following:
  o Use or giving of any unauthorized assistance in taking quizzes, tests, or examinations;
  o Use of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; or
  o Acquisition, without permission, of tests or other academic material belonging to a member of the institutional faculty or staff.
  o Discussing an exam with students who have not yet taken the exam.
  o Acquisition of partial problem solutions from the web.
  o Working on individual assignments with anyone other than the instructor.
  o Working on group assignments with anyone not included in the group.

• **Plagiarism**, which is defined as, but is not limited to, the following:
  o The use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment consistent with accepted practices of the discipline;
  o The unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

• Other forms of dishonesty relating to academic achievement, research results or academically related public service;

• Furnishing information known or believed to be false to any institutional official, faculty member or office;

• Forgery, fabrication, alteration, misrepresentation or misuse of any document, record, or instrument of identification,
including misrepresentations of degrees awarded or honors received;

**Cheating:** If you cheat on a test or assignment, you may fail the course. At the very least, you will get a *negative score* on that test or assignment since cheating is worse than doing nothing. Discussing a problem with other students is a valuable learning tool, copying someone else's work is not.

**Resources:**
- Your instructor (please come see me!)
- Other students in class – try to work on homework problems together. It really helps!
- Tech Learning Center (TLC) in Devereaux Library.

*Continued registration for this course implies acceptance of the preceding policies.*

**ADA statement:** Students with special needs or requiring special accommodations should contact the instructor, (Dr. Braman, at 355-3459) and/or the campus ADA coordinator (Jolie McCoy, at 394-2416) at the earliest opportunity.

**Freedom in learning:** Under Board of Regents and University policy student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact the dean of the college which offers the class to initiate a review of the evaluation.