Syllabus for Math/CS 471, Introduction to Scientific Computing
Fall, 2018, University of New Mexico
Version 1, Dated August 21, 2018

Time and Place:
1. Tuesday, DSH 233, 8am-9:15am
2. Thursday, DSH 144, 8am-9:15am

Course webpage: http://math.unm.edu/~schroder/471_Fall_2018/index.html

Instructor: Prof. Jacob B. Schroder, jbschroder@unm.edu

Office Hours: SMLC 332
1. Tuesday: 9:30am-11am
2. Wednesday: 2:30pm-4:00pm
3. By request

Prerequisites: Math 314 or 321 (linear algebra), and Math 316 (ODEs), and programming skills.

Text (optional): V. Eijkhout (with E. Chow and R. van de Geijn), Introduction to High Performance Scientific Computing

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Course Description: This is an introductory course in scientific computing. The course is broad and exposes you to a variety of concepts and algorithms for parallel scientific computing, covering hardware, software, and programming. This includes:
- Multicore, cluster, and supercomputer architectures
- The C/C++ language and Python scripting
- The parallel computing language extensions of MPI and OpenMP
- Parallel performance evaluation and modeling
- Understanding the stability and error analysis of numerical methods
- ODE and PDE applications such as diffusion, the heat equation and wave propagation
- Scientific software development.
- Additional topics may be covered, at the instructor's discretions, depending on time and student interest.

Goals: This course will allow you to
- Write, document, and optimize scientific computer programs according to modern practices.
- Understand how machine architectures impact the performance and design of scientific software.
- Have hands-on experience using scripting to both automate your computations and analyze your computational results.
- Understand the basic concepts of parallel computing and to write parallel programs for shared, distributed, and hybrid memory models.

Grading: Your grade for this course is based on 6 homework sets (750 points), a final project (200 points), and in-class work and attendance (50 points). This allows for a total of 1,000 points. Letter grades will then be assigned according to the following scheme: A+: 970 points or above, A: 900-969 points, B+: 870-899 points, B: 800-869 points, C+: 770-799 points, C: 700-769 points, F: below 700.

The instructor reserves the right to curve grades to offset unforeseen circumstances. Such a curve will never decrease a student's letter grade below that from the above scheme.

Homework/Project: There will be 6 sets of homework assignments and one final project. They have the following points 50, 100, 150, 150, 150, 150, 200, respectively, making a total of 950 points. Each homework and the project may consist of a combination of theoretical problems and programming tasks.

You are strongly encouraged to work in pairs (a group of two students) for the homework and hand in a single report, but it is expected that both of you can explain the material and the computer outputs. Groups of more than two students are not allowed. For the write-ups of the assignments we will use a version control system.

The languages used for this course are ***C/C++, MPI, and Python***. If you wish to use another language, I will not be able to provide technical assistance.

Please note that in this particular course, assignments are not only a way of assessment, but also serve as important tools for you to digest the course topics. In most cases, late homework is not accepted. If you are going to miss a homework due-date, please talk to me in advance.

Dishonesty policy: Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, including dismissal, against any student who is found responsible for academic dishonesty. Any student who has been judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course. Academic dishonesty includes, but is not limited to, dishonesty on quizzes, tests or assignments; claiming credit for work not done or done by others; and hindering the academic work of other students.

Americans with Disabilities Act (ADA): In accordance with University Policy 2310 and the ADA, students who need academic accommodations and/or assistance in emergency evacuations should contact me as soon as possible to ensure their needs are met in a timely manner. It is imperative that you take the initiative to bring such needs to the instructor's attention, as the instructor is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Contact Accessibility Services at 505-661-4692 for additional information

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Title IX: In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants (TAs), and Graduate Assistants (GAs) are considered "responsible employees" by the Department of Education (see page 15, http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (http://oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html

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Disclaimer: I reserve the right to make reasonable and necessary changes to the policies outlined in this syllabus. Whenever possible, the class will be notified in advance of such changes. An up-to-date copy of the syllabus can always be found on the course website. It is your responsibility to know and understand the policies discussed therein and to be up-to-date. If in doubt, please ask questions.