ACMS/Math 20210: Scientific Computing

Meeting: MWF 2-2:50 P.M. @ Hayes-Healey 127

Instructor: Dr. Daniel Brake   Office: Hurley Hall 152 B

email: dbrake@nd.edu

Office Hours: Mondays 10:30-12 noon, Hurley 154

Teaching Assistant: Wenzhao Sun   Office: Hurley Hall 172

email: wsun2@nd.edu

Office Hours: Thursdays 3:00 – 4:00 PM

Course Description: An introduction to solving mathematical problems using computer programming in C++. No prior programming experience is assumed.

Textbook: "Engineering problem solving with C++, 3rd Edition" by Delores M. Etter and Jeanine A. Ingber, Prentice Hall 2012.

Homework and Projects: Homework assignments will be assigned each week on the Sakai site and collected electronically. At the semester, a project incorporating all you have learned will be assigned. Homework and assignments need to be submitted before the due time. Late homework will be accepted, with 15% deduction for each day after due date, and homework more than 3 days late will not be accepted; *e.g.* if due date is 13th and you turned in your homework on 15th you will receive 70% of your earned score.

You are encouraged to work on homework and project problems in groups, but the assignments must be turned in individually. Remember -- you will not learn anything by simply copying another student's work.

Exams: There will be one in-class midterm exam and one final exam. Midterm is scheduled on October 15th. Final exam is scheduled on Tuesday, December 16th from 16:15 – 18:15 (4:15-6:15), location TBD. Students should take both midterm and final exams unless he or she has written permission from the Vice president for residential life. If you have a valid excuse (illness, excused athletic absence etc.) for missing an exam, please see me ASAP (preferably before the exam) and a makeup exam will be scheduled.

ACMS/Math 20210: Scientific Computing

Grades: Homework and projects 150 points, midterm exam 100 points, final exam 150 points. Cutoffs for major grades (A, B, C, D, F) will be assigned for each exam and announced in class so students have some indication of their level of performance. Your final grade will be assigned on the percentage of your total score out of 400.

There will be bonus homework questions, each worth 5 points. These questions are based on real interview questions of top IT companies and were designed to challenge you. Most likely the time you spend in these questions will not worth the bonus points you receive for this course, but I would recommend those who are interested in a technical job in a big-name company solving them because it will help you crack the interview ☺

Honor Code: Both examinations, homework and projects are conducted under the honor code. While cooperation in small groups in doing homework (including bonus questions) and projects is permitted (and strongly encouraged!), copying is not. Exams are to be done completely by you with no help from others.

Tentative Syllabus

• Introduction on computing, development environment setup

• Simple C++ programs

    (1) Program structure (2) Data types (3) C++ operators Input and Output

    (4) Basic mathematical functions

• Control structures

    (1) Conditional Expressions: if/else statement, switch statement

    (2) Iterations: while loop, do/while, for loop, break and continue statements

• Working with data files

    (1) File stream Read file Write file (2) Error checking

• Functions

    (1) Programmer-defined functions (2) Parameter passing (3) Applied problems

• One dimensional arrays

• Two dimensional arrays and matrices

• Pointers, classes, and object oriented programming (OOP)