MTH 337 **Introduction to Mathematical and Scientific Computing** **Spring 2010**

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Lectures: Tue/Thu 8:00-9:20 in Baldy 8B
Recitations: Thu 9:30-10:30 in Baldy 8B - note recitation *will meet* the first week of class
Prerequisites: MTH 141, MTH 142 with grade of "C" or above, or equivalent background in calculus.

Goals: The overall goals of the course are for the student to develop:
(i) expertise in solving mathematical problems using computers
(ii) intuition and experience in good programming and computing
(iii) knowledge of fundamental mathematical ideas used in computation
(iv) understanding of the similarities and differences between different software frameworks.
(v) experience in researching, solving and writing results to in-depth problems.

How the course works: A little bit of lecture on a topic, then a brief demo of software and/or an algorithm. Students then try out the methods themselves on simple exercises in an informal, cooperative, learning-by-doing lab setting. Homework is an extension of in-class activities. Quizzes test practical application of ideas. Projects investigate certain topics in greater detail and develop skills in research, writing and critical thinking.

Tentative Syllabus

1. Computer systems and software
2. Integer computations and problems
3. Finite precision computations
4. Discrete vs continuous computational models
5. Computer graphics
6. Newton's method for finding roots of an equation
7. Polynomial interpolation of data
8. Least squares fitting of data
9. Randomness in computations
10. Sorting and searching data
11. Acoustic data processing and analysis
12. Linear programming and optimization problems
13. Finite difference methods for differential equations
14. Finite difference methods for partial differential equations
15. Cellular automata

Course Materials

Book: No text for the course. We will primarily use online resources.

UBLearns: Contains posting of material for viewing/download such as programs and external links.

Computer Account: An "nsm" computer account is used in Baldy 8B, Bell 101 and linux.nsm.buffalo.edu. This is different from your UBIT account. An account should already have been set up for you. Please contact me if you have any problems.

Software: All software needed for the course (Linux operating system, Maple, Matlab, LaTeX, Acrobat Reader, Text Editor, Firefox web browswer, Ghostscript Viewer, ...) is available through your nsm account on the lab machines in Baldy 8B, Bell 101 and by remote login to linux.nsm.buffalo.edu from your own computer.

Coursework

Homework: Homework will be collected about once a week. Homework is due at the beginning of class on the date specified; late homework is accepted until 5pm with a 10% penalty.

Projects: There will be 2-3 longer "projects" which involve some analysis, computation, critical thinking and writing. Late projects are accepted with the following penalties.

- turned in on due date by 5pm = -10%
- turned in next day by 5pm = -20%
- turned in second day by 5pm = -30%
- after 5pm of second day late = not accepted

Quizzes: Every other week. The worst quiz score is dropped for calculation of quiz grade

Participation: Come to every class and participate in a cooperative, interactive way.

Course grades

Your **final grade** is determined by averaging your grades for quiz and homework/projects with the following weightings (+/- grades will be used). There is no final exam for the course.

Quizzes	40%
Homework and Projects	50%
Participation	10%

For averaging grades, a **5-point grading scale** is used in the course:

A+ = 4.67-5.00	B+ = 3.67-4.00	C+ = 2.67-3.00	D+ = 1.67-2.00
A = 4.33-4.67	B = 3.33-3.67	C = 2.33-2.67	D = 1.33-1.67
A- = 4.00-4.33	B- = 3.00-3.33	C- = 2.00-2.33	D- = 1.00-1.33

Other info

Baldy 8B Lab Etiquette - Please do not use the lab computers for tasks unrelated to MTH 337 (eg IM, web surfing, email, work for other courses, ...). And yes, the sign in the lab does say "No eating or drinking".

Academic Honesty: Students are expected to follow the university policy on academic honesty. You may discuss homework and projects with others, but the work you turn in should be written by you. Cheating on quizzes or copying of assignments is explicitly forbidden. You must have your student ID for exams.

Incompletes: Incompletes will be given only under extraordinary circumstances (like surgery during the last week of class).

Important Dates:
Fri Jan 22 - Last day to drop the course - no record appears on transcript
Fri Jan 22 - Last day to file 'Petition to make up an incomplete' with the Department
Fri Mar 26- Last day to resign from the course - an 'R' appears on transcript (first semester undergraduates have an extended deadline through their academic advisor).

Students with disabilities:
If you have a diagnosed disability (physical, learning, or psychological) which will make it difficult for you to carry out the course work as outlined, or requires accommodations such as recruiting note takers, readers, or extended time on exams and/or assignments, please advise me during the first two weeks of the course so that we may review possible arrangements for reasonable accommodations.