Course Outline: Winter 2013

University of Saskatchewan
Department of Computer Science

NUMERICAL SOFTWARE (CMPT 898 (02))

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Prerequisites: Permission of the instructor (numerical analysis or programming experience desirable)
Text: Relevant reading material to be provided throughout the course.

Course Objectives: Demonstrated experience with writing numerical software is a marketable attribute. This course is designed to give students some skills and experience in the design and implementation of non-trivial numerical software. Students may be required to perform such a task as part of their individual research, but perhaps more importantly, this course aims to provide a realistic scenario in which students can imagine what it might be like to use their scientific training in industry. Specifically, students will enhance existing code as well as design and write their own from scratch; they will code in teams; they will set and track their milestones by means of bi-weekly oral and/or written progress reports. Topics will be covered as warranted by the scope of the projects and the interests of the students. For this particular offering, it is anticipated that the topics include numerical methods for differential equations, quadrature, optimization, and high-performance computing.

I. The Purpose of Numerical Software

a. Introduction to numerical software
b. Fundamental concepts of numerical computing: error analysis, stability, high-performance computing
c. Fundamental concepts of software: reliability, efficiency, robustness, portability

II. The Software Process

a. Milestones; deliverables
b. Listening, communicating, learning, designing
c. Debugging
d. Automated testing and verification
e. Programming in teams

III. Project/Team Selection

a. Selection of specific projects/teams
b. Presentation of suitable background material

Required Class Activities used for Evaluation:

- Milestone reports (4; 5% each): 20%
- 2 presentations (including software demonstration): interim 5%; final 10%
- interim progress report (including software) 10%
- final report (including software) 55%

Important Regulations

- All students must be properly registered in order to attend lectures and receive credit for this course.
- Failure to write the final exam and/or complete the final project will result in a failing grade for the course.
- To obtain a passing grade in this course, a student must obtain a mark of at least 40% on the project.
- Course announcements regarding assignments and examinations as well as lists of frequently asked questions and other information may and will be communicated to the class via this website and/or by *e*-mail. The student is responsible for reading the course website regularly and the account associated with the official *e*-mail address on file with the University of Saskatchewan.
- Students will be subject to Examination Regulations on incomplete course work if the required elements of the course are not completed. Required elements of this course include the term project.
- A student who misses a required course activity due to illness must contact their instructor **no later than on the day of the activity** explaining the reason for their absence. The student must subsequently provide appropriate medical documentation to the course instructor at which time the instructor and the student shall discuss how the missed activity will be made up.
- A student who cannot attend a required class activity for religious reasons or due to a conflict with another class or examination must inform the instructor **at least two weeks prior to the test date** so that alternative arrangements can be made.
- Deadline extensions will be granted only by the course instructor. If there are serious medical or compassionate grounds for an extension, the student must contact their instructor **on or before the due date** of the deadline explaining their situation and to make arrangements to provide the appropriate documentation. Upon receipt of this documentation the instructor will consider whether to grant an extension. **Extensions will not normally be granted if the course instructor or office is contacted after the due date of a required course activity.**

Academic Honesty

Students are expected to be academically honest in all of their scholarly work, including course assignments and examinations. Academic honesty is defined and described at the University of Saskatchewan Academic Honesty Website `http://www.usask.ca/honesty`.

If an instructor has reason to suspect academic dishonesty on an assignment, the instructor will not return the original assignment to the student. The instructor and student shall meet to discuss the issue and attempt to resolve the issue. If the instructor and student cannot resolve the issue, the assignment will be forwarded along with all relevant evidence to the Arts and Science Academic Affairs Committee for a disciplinary hearing.

The Student Academic Affairs Committee treats all cases according to the University Policy on Academic Honesty and has the right to apply strict academic penalties. More details can be found at

`http://www.usask.ca/university_council/reports/09-27-99.shtml`.