CSC 7700 High Performance Optimization, Fall 2014

Instructor: Dr. Whaley (rcwhaley@lsu.edu)
Office: 3115 Patrick Taylor Hall
Office Hours: Monday or Wednesday 4-5PM or by appointment.
Office Phone: 578-7669 or 578-5481
Class homepage: http://www.csc.lsu.edu/~whaley/teach/cs7700_F14/
Class hours: Monday and Wednesday, 2:30-3:50PM.

Textbook: none.

Prereq: CSC 7080 / EE 4720 Computer Architecture or equivalent. Experience in systems programming, and including understanding of pointers and ANSI C. We will be programming in a Linux environment, using ANSI C and assembly.

Grading: There are two grading schemes available for this course. In the default scheme, the majority of grade comes from actual programming assignments, whose purpose is to extend your understanding of the topics under discussion. If oral/written quizzes show inadequate student preparation, or if homework is of low quality or exceedingly uniform, I will be forced to rely more heavily on testing to ensure that students are understanding the material, as shown in the test-based grading scheme. If this occurs, I will announce the change to the class, and the written testing will begin in the following week.

Default grading scheme:
- 85-95% of grade from projects, including final project:
  - 0-2 presentations per student
  - Rest determined by extensive programming projects
- 0-10% oral/written quiz
- 5% class participation
- No written final (final project instead)

Test-based grading scheme:
- 35% prog projects, including final project
- 60% written exams, including final exam
- 5% class participation

Students are expected to be able to fully explain the workings of their own programs, and may be called upon to do so. If they cannot, no credit will be given for that assignment.

Attendance: You are responsible for all material presented in class. Exams and due dates will be scheduled in advance. A grade of zero will be recorded for missed exams unless prior arrangements are made (only allowed in extraordinary circumstances). Assignments turned in after the due date, but before the beginning of the next scheduled class will be penalized 5-10%. Assignments that do not compile/assemble or are handed in more than one class period late will usually result in a grade of zero.

Cheating: Students are encouraged to discuss programs in a general way to gain greater insight. Copying another’s code, writing code for someone else, or allowing another to copy your code are cheating, and can result in a grade of zero for all parties. Therefore, take precautions so that your old printouts, unattended screen, etc. are not available to other students. Discussing the details of the solution or showing/examining actual code are not acceptable. If you are in doubt whether
an activity is permitted collaboration or cheating, ask the instructor.

**Decorum**  
Students are expected to refrain from side conversation or other distracting behavior in class. Students should arrive on time for class; if late, come in quietly with a minimum of disturbance. In computer classrooms, the monitor must be turned off, and the keyboard placed behind the monitor prior to the start of class. All cell phones/pagers/PDAs/etc. should be turned OFF before the beginning of class, and not be consulted in any way during class. During testing, any such consultation may result in a grade of zero. Violations of this policy will minimally result in expulsion from the classroom, and repeated violation will result in expulsion from the course.

**Email**  
Questions about lectures, homework and course organization may be sent to the professor. I cannot guarantee an immediate response, but will address the issue through direct response, general announcement, or a suggestion to visit during office hours. Last minute questions (i.e. sent the night before an assignment is due) may not be answered before class begins, so tackling problems early is encouraged.

**Regrading**  
If you believe I have made an error in grading your exam, quiz or assignment, you may submit the graded work along with a written request for reconsideration. You must explain in writing clearly and succinctly the reasons your grade should be changed. In fairness to other students, we cannot vary the grading criteria on an individual basis, though suggestions may be taken into consideration for future classes.

**Material**  
Topics of interest include (but are not limited to): (1) Complexities of getting reliable and context-sensitive timings on actual hardware in the real world, (2) Overviews of several architecture areas critical to optimization, including memory hierarchy, pipelining, superscalar exploitation, etc., (3) Application of traditional optimizations on various architectures including: software pipelining, superscalar scheduling, scalar expansion, blocking/tiling, and various array optimizations (contiguous vs. strided vs. pointer to pointer access, TLB issues, etc.), (4) Basics of assembly programming (particularly x86) – necessary to do extremely low-level optimization, including SSE, (5) Exploiting low-level architectural features, including SSE and prefetch, (6) Basics of IEEE floating point arithmetic and storage

**Disability**  
If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact University Disability Services (DS), 115 Johnston Hall, 225-578-5919 (Voice), 225-578-4560 (Fax), disability@lsu.edu homepage: http://disability.lsu.edu/. Please bring a letter to me from the DS indicating your need for academic accommodations within the first week of class. The syllabus and other class materials can be made available in alternative format upon request.

**Syll changes**  
This syllabus is provided for informational purposes regarding the anticipated course content. It is based upon the most recent information available on the date of issuance, and is as accurate and complete as possible. The instructor reserves the right to make any changes deemed necessary and/or appropriate. The instructor will make his best effort to communicate any changes in the syllabus in a timely manner, and post the updated document to the class homepage.