CS 355/596: Multithreaded Programming
Course Syllabus

Contact Information

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Office hours:	T 2:30-3:30, W 12:30-13:30, F 10:30-11:30, or by appointment

Course Description This course presents an introduction to multi-threaded and distributed programming. The course covers some classical problems and synchronization mechanisms, as well as modern libraries that support parallel programming. The course also covers distributed programming models and applications to video-game programming.

Course Objectives This course is designed to promote individual learning and analytical thinking skills. It combines lecture, reading, and projects implementation.

Upon successful completion students should

- have deep understanding of benefits and disadvantages of parallel programming model
- be able to write efficient code using win32 threads and POSIX threads
- know core designs utilizing multithreaded model

Course	Day and Time	Room
CS355/CS596	M/W 10:30-11:50am	Pascal

Textbooks and References
Required

- *The Little Book of Semaphores*, by by Allen B. Downey `http://greenteapress.com/semaphores/LittleBookOfSemaphores.pdf`
- *C++ Concurrency in Action: Practical Multithreading*, by Anthony Williams
- Slides on class web-site

Grading

Grades will be derived from homework assignments and exams.

Requirement for Graduate Students: additional to the lectured materials and standard projects, all graduate students in this class are required to perform extra tasks to promote individual learning and analytic thinking. Typical tasks will include reading research articles (instructor will provide a list of selected papers) and presenting it to the class.

The detailed weightings and letter grades are as such:

Undergraduate students:		Graduate students:		Letter grade distribution:	
				x%	Grade
				$x \geq 93$	A
				$90 \leq x < 93$	A-
Programming assignments	50%	Programming assignments	50%	$87 \leq x < 90$	B+
Midterm	20%	Midterm	20%	$83 \leq x < 87$	B
Final project/exam	30%	Final project/exam	30%	$80 \leq x < 83$	B-
				$77 \leq x < 80$	C+
				$73 \leq x < 77$	C
				$70 \leq x < 73$	C-
				$60 \leq x < 70$	D
				$x < 60$	F

Attendance is mandatory. There are no makeup exams or quizzes. Also, for every lecture that is missed, you will lose one point from your final grade (e.g. a 90 becomes an 89). The only exceptions are if you notify me prior to your absence with a valid reason. (Sleeping, studying for another class, working on your game, etc., are not valid reasons for an absence.) Class participation will boost your grade if you are on the border. (e. g. It is possible to get an A- with an overall average of 88.5%)

Classroom policies.

- No food.
- Drinks are allowed, unless prohibited by School policies.
- No loud noises.
- Laptops are allowed if used to display lecture material.
- No strong smells.

Tentative Schedule

Week	Topic	Reference Material
1	Introduction, mutex, semaphore	TLBS ch. 1,2
2	Randezvous, barrier, reusable barrier, POSIX threads (no Monday class)	TLBS ch. 3
3	Producer-consumer, readers-writers,	TLBS ch. 3
4	C++11 threading library	CIA
5	Lock-based concurrent data structures	CIA ch. 6
6	Lock-free concurrent data structures, midterm 1	CIA ch. 7
7	Lock-free concurrent data structures (no Monday class)	CIA ch. 7
	spring break	
8	Parallel algorithms	Notes
9	Parallel algorithms	Notes
10	OpenMP	Notes
11	TBD	
12	midterm 2	
13	Presentations	
14	Presentations	

Submitting Homework Programming assignments will use C++ language. More specifically, all programs must adhere to Standard C++. Assignments will be graded using Microsoft's GNU's gcc/g++ compilers (version 5.4). Each assignment will either have a `Makefile` specifying which compiler to use, or in some cases students will provide their own `Makefile`'s using compiler of their choice.

Your source code should be archived in zip format.

There will be several programming assignments during the semester, with the first one being assigned during the second week. You will be given between 14 and 28 days to complete each assignment. This gives you adequate time to manage your workload. The amount of time actually required to complete an assignment is much less than the time allotted and is generally between 5 and 20 hours. Depending on your grasp of the subject matter during the lectures, some of you will require more or less time to complete the assignments. In any event, you should plan on devoting 5 hours per week to this course (outside of the lectures).

Academic integrity Academic dishonesty, or cheating, occurs when a student represents someone else's work as their own, or assists another student in doing so. This can happen on exams, quizzes, homework, or projects. Academic dishonesty also may occur when a student uses any prohibited reference or equipment in the completion of a task. For example, the use of a calculator, notes, books or the internet when it is prohibited. Plagiarism is a common form of academic dishonesty. This can take the form of copying and pasting exerpts from the web, and representing them as original work. The type and severity of any occurence, as well as the legitimacy of any claim of academic dishonesty, will be judged by the instructor and the disciplinary committee. All students are asked to help in promoting a culture of academic integrity by discouraging cheating in all forms.

Accommodations Students with physical, psychological or learning disabilities that affect their ablities to perform major life activities associated with this class may be eligible for reasonable accommodations under the Americans with Disabilities Act. If you have a documented disability please contact the Disabilities Support Servicies office to arrange for accomodations for this class.