DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES
UNIVERSITY OF TORONTO MISSISSAUGA

CSC367H5F LEC0101
Parallel Programming
Course Outline - Fall 2019

Class Location & Time	Tue, 01:00 PM - 03:00 PM NE 1190
Instructor	Bogdan Simion
Office Location	
Office Hours	
E-mail Address	bogdan@cs.toronto.edu
Course Web Site	https://mcs.utm.utoronto.ca/~367

Course Description

Introduction to aspects of parallel programming. Topics include computer instruction execution, instruction-level parallelism, memory system performance, task and data parallelism, parallel models (shared memory, message passing), synchronization, scalability and Amdahl's law, Flynn taxonomy, vector processing and parallel computing architectures. [24L, 12P]

Prerequisite: CSC209H5, CSC258H5, CSC290H5
Exclusion: CSC367H1 (SCI)
Distribution Requirement: SCI

Students who lack a pre/co-requisite can be removed at any time unless they have received an explicit waiver from the department. The waiver form can be downloaded from here.

Textbooks and Other Materials

Strongly Recommended:

1. Introduction to Parallel Computing - A. Grama, A. Gupta, G. Karypis, V. Kumar

2. CUDA by example: An introduction to General-Purpose GPU programming - J. Sanders, E. Kandroot

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Recommended additional books:

1. An Introduction to Parallel Programming - Peter Pacheco

2. Parallel programming in C with MPI and OpenMP - Michael J. Quinn

3. The Art of Multiprocessor Programming - Maurice Herlihy and Nir Shavit

4. Professional CUDA C Programming - John Cheng, Max Grossman, Ty McKercher

5. Parallel Programming: Concepts and Practice - Bertil Schmidt, Jorge Gonzalez-Dominguez, Christian Hundt, Moritz Schlarb

Assessment and Deadlines

Type	Description	Due Date	Weight
Assignment	A1 - System Performance and Profiling	2019-09-29	8%
Assignment	A2 - Parallel Data and Task Managemen	2019-10-19	10%
Assignment	A3 - Shared Memory and Message Passing	2019-11-09	10%
Assignment	A4 - GPU Programming	2019-12-01	10%
Term Test	Midterm (in lecture time); covers the weeks preceding the midterm	2019-11-05	10%
Quiz	Exercises in lectures and labs	On-going	12%

Final Exam	TBA	40%
	Total	100%

More Details for Assessment and Deadlines

- **Lab Exercises 8%:** For each lab, you will be asked to turn in a small piece of work. The activity during labs can be done either individually, or with 1 partner. Many of these activities will strengthen your understanding of the concepts taught in lectures and/or prepare you to be able to undertake the assignments. We will take the best 8 out of 10 scores (for a 1% each).
  No grace periods may be used for the lab exercises.

- **In-Class Exercises 4%:** There will be in-class exercises (almost) each week. These will be graded on participation. As with lab exercises, we will take the best 8 out of 10 scores (for a 0.5% each, in this case). We strongly encourage you to do these exercises in class, to get a clearer understanding of the material, and welcome questions during these activities.

- **Assignments 38%:** Over the term, you will complete 4 assignments. For all four assignments, you may work individually or with one partner. To submit your assignment, check your work into your repository. **Both partners MUST understand ALL parts of the assignments.** We may schedule and conduct **interviews** for some or all assignments, after the due date, to determine if both partners have a good understanding of the entire assignment. Those who do NOT, will receive a ZERO on it.

- **Midterm (10%) and Final Exam (40%):** The midterm is scheduled in class and covers the material in the first weeks leading up to the midterm. The final exam is comprehensive, 3 hours, and held during the exam period. You must obtain a 40% to pass the course; otherwise, your final mark will be set no higher than 47%.

Penalties for Lateness

Late Work: All assignments are submitted electronically and are due at **10 p.m. sharp** on the due date. Each student is granted **ten 2-hour grace tokens** for the entire semester, to be used on any of the assignments as you see fit. Submitting an assignment up to 2 hours late uses one token. Once your tokens have been used late assignments *will not be accepted*, except in extremely special circumstances. Grace days *may not be used for exercises*. Additionally, if you partner for assignments, for each extra 2 hours, a grace token will be deducted from **both** partners (which means that in effect, you can use up to at most the minimum number of grace tokens between the team members). This is such that those who prefer to work individually are not at a disadvantage. Please note that 10:00:01 p.m. will be considered late, and ensure that your work is not submitted at the very last second. Because you will be using version control, it is very easy to commit regularly to avoid running into the deadline.

Religious Holidays: If a religious holiday will keep you from completing any assigned work, please let the instructor know as soon as possible (but no later than two weeks before the due date), and we will work out a mutually agreeable accommodation.

Procedures and Rules

Missed Term Work

If you are unable to complete an assignment or if you miss a test due to major illness or other circumstances completely outside of your control, please contact your instructor immediately. To request special consideration, bring supporting documentation to the instructor in person during office hours or via email. You must do so **at least a week in advance of the due date, or in special circumstances, at least 48 hours before the due date**.

In case of illness, you must provide a **U of T Verification of Student Illness or Injury form** (U of T medical certificate) to the instructor **within one week of the missed work**. The certificate must be **filled by your doctor** and specify the exact period during and the extent to which your illness made you unable to carry out that piece of academic work.

Exact accommodations will be determined **on a case-by-case basis and will not be given automatically**. In other words, you risk getting a mark of zero for missed work unless you contact your instructor promptly.

As general advice, if you have any concerns or questions regarding your situation, please contact your instructor or your College Registrar, as they are well-equipped to help you with anything you may be going through.

Missed Final Exam

Students who cannot write a final examination due to illness or other serious causes must file an online petition **within 72 hours of the missed examination**. Original supporting documentation must also be submitted to the Office of the Registrar **within 72 hours**

of the missed exam. Late petitions will **NOT** be considered. If illness is cited as the reason for a deferred exam request, a U of T Verification of Student Illness or Injury Form must show that you were **examined and diagnosed at the time of illness and on the date of the exam, or by the day after at the latest**. Students must also record their absence on ACORN on the day of the missed exam or by the day after at the latest. Upon approval of a deferred exam request, a non-refundable fee of $70 is required for each examination approved.

Academic Integrity

Honesty and fairness are fundamental to the University of Toronto's mission. Plagiarism is a form of academic fraud and is treated very seriously. The work that you submit must be your own and cannot contain anyone elses work or ideas without proper attribution. You are expected to read the handout How not to plagiarize (http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize) and to be familiar with the Code of behaviour on academic matters, which is linked from the UTM calendar under the link Codes and policies.

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All of the work you submit must be done by you (and your partner, where applicable) and your work must not be submitted by someone else. Plagiarism is academic fraud and is taken very seriously. The department uses software that compares programs for evidence of similar code. Please read the Rules and Regulations from the U of T Code of Behaviour on Academic Matters.
Here are a few guidelines to help you avoid plagiarism:

- Never look at another student's or group's assignment solution or idea for a solution, whether it is on paper or on the computer screen, and don't allow your solution to be viewed by or come into the possession of another student. Maintain absolute control of your work - including notes and partial solutions - at all times.
- We encourage you to discuss course concepts and to study for exams with other students, but any work that is submitted should be your own. The easiest way to avoid plagiarism is to only discuss submitted work with the TA or instructor. Similarly, Google (and Wikipedia) may help you with course material, but do not use the internet to look for solutions to the assignment problems.
  Plagiarized assignments may result in a 0 in the course, plus one or several terms academic suspension!
- Important: **Never look for assignment solutions online.** Places like public Github repositories may contain code that may be useful in your assignments. Using someone else's code and ideas, even if making some changes, is considered plagiarism. Keep in mind that our plagiarism detection software will definitely detect such cases.
- Important: **You must discuss the assignment with your partner, not just to understand the content, but also to avoid the unfortunate situation where your partner might be committing plagiarism.** If you suspect that your partner does not understand their own code, it may be a sign that your partner has plagiarized the code from other sources. Keep in mind that you are responsible for all the work submitted and plagiarism cases will be prosecuted for both assignment partners, so you must be vigilant and involved in all parts of the assignment.

Final Exam Information

Duration:	3 hours
Aids Permitted:	2 page(s) of double-sided Letter (8-1/2 x 11) sheet

Additional Information

Website and Discussion Board: The course website contains lecture notes, assignment handouts, lab handouts, etc., as well as a link to a discussion board. The discussion board can get you fast, accurate response to your questions - but it only works if everyone participates! The discussion board is recommended daily reading, in order to encourage a fruitful discussion forum. If you are not comfortable with using the discussion board for whatever reason, we can make alternate arrangements for you to at least view the discussions. Please have a look over the the course website, and come talk to me if you would like to discuss this matter further.

Email: Please use email for personal issues and the discussion board for all other course-related questions. I try to respond to email by the end of the next day. However, due to volume, it may take longer, especially on weekends. (I am often not able to answer email more than once on the weekend.)

Anonymous Feedback: If you have feedback about the course, the web page includes a link to an anonymous email form. (You also have the *option* of including your name, if you wish.) Since the sender is completely anonymous, I will not be able to respond to you unless you include your email. However, if an issue raised anonymously is of general interest to the entire class, I will consider addressing it at the beginning of class or on the discussion board.

Minimum Standards for Submitted Work: For your assignment to be graded, it must meet the minimum standards of a professional computer scientist. **All** files required to build the program **must** be submitted, and the program must compile cleanly, without errors or warnings on the lab machines. Last minute difficulties with version control can easily be avoided by ensuring all files are added to the repository well before the deadline, and that you know how to commit and push them. Compiling and testing your work on the teaching lab machines at intermediate stages will avoid last minute problems as well. **Submissions that are missing files or do not compile will receive a grade of 0.**

Re-mark Requests: If you consider that a piece of work has been mis-marked, you may request a re-mark. For a re-mark to succeed, you must clearly and concisely express what you believe was mis-marked. To request a re-mark, use the form for the respective assignment on MarkUs. Requests must be submitted within ***1 week*** of the marks being returned. An exception is the last assignment when you will need to submit remark requests ***within 3 days*** of getting back the results, to allow timely remarks before the end of term. Be prepared for your entire work to be reevaluated. Remarking may increase the original grade, leave it as is, or *potentially decrease* the original grade.

Accessibility Needs: Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or Accessibility Services as soon as possible.
Accessibility staff (located in Room 2037, Davis Building) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. Please call 905-569-4699 or email access.utm@utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Last Date to drop course from Academic Record and GPA is November 7, 2019.