STUDENT INFORMATION SHEET
CPSC 677, PARALLEL PROCESSING, FALL 2022

Course Information

- **Days/Times/Place**:
  75478 CPSC 677 010 MW 2:00 PM – 3:15 PM CAS 136
- **Web page** : *https://timoneilu.github.io/teaching/cs677/*
- **Prerequisites**: Admission to the Computer Science Master's Program or permission.

Course Description

Course Rationale :

With advances in technology, parallel computers have become readily available and affordable, making high-performance computing and supercomputing accessible to a much larger segment of the industry. This course explores the specific model of parallel programming using graphics processing units (GPUs) in depth. Along the way, we will discuss practical performance optimization and evaluation techniques for GPU computing.

Learning Objectives :

- To understand
  - The current state-of-the-art in GPU programming environments (i.e. shared-memory architecture, SIMD model), portable software libraries (i.e. CUDA) and parallel program development.
  - The complex interactions between hardware and software in GPU computing and how they affect performance.
- To apply and demonstrate mastery of the presented course concepts by writing a series of programs using the C programming language with CUDA extensions and the Linux and MS Windows operating systems.
- To exhibit the ability to teach and learn from others.

Course Personnel

Instructor : Dr. Tim O'Neil
Contact Info : *Office* : CAS 221A *Phone* : (330) 972 – 6492 E-*mail* : *toneil@uakron.edu*
Office Hours : MW 3:15 – 4:30 in CAS 221; T 11:30-12:30, R 2:30 – 3:30 in Polsky M183J; and by appointment.

Course Outline

Textbook : Kirk and Hwu, *Programming Massively Parallel Processors: A Hands-On Approach* (3rd Ed., Elsevier, 2017).
Topics : Parallel Programming using GPUs and CUDA

- CUDA Programming Model, Threads and Memories
- Floating-Point and Performance Considerations
  - Review Topics: Caching, Performance Metrics
  - Fundamental issues: data locality and dependencies, fine-grained parallelism
  - Improvement techniques, e.g. loop transformations

Course Grading

Items : Five, 20% each:

- Midterm (Monday October 10 in-class) and Final (Wednesday December 7, 2:30 PM) Exams
- Final Project
- Programming Projects
- Homework, Quizzes, and Class Participation

Approximate Scale :
A 88 – 100, B 75 – 87, C 62 – 74, D 49 – 61. Plus/minus grades assigned at my discretion.

Other Class Policies, Fall Semester 2022

Registration/Drop/Withdrawal

- Students whose names do not appear on the university's official class list by **Sunday August 28** will not be permitted to participate (attend class, take exams or receive credit).
- Students may drop a course online (without my signature) through **Sunday September 4**. Courses dropped by this date will not appear on a student's transcript.
- Students may withdraw from a course online (without my signature) through **Sunday October 9**. A "WD" will appear on the student's transcript.

Scholastic Honesty and Professional Integrity

- All work turned in for grade is to be exclusively the work of the student(s) whose name(s) appear(s) on the work. Incidents of academic dishonesty (such as cheating or plagiarism) will be handled in accordance with university policy by the Office of Student Conduct. In particular, the use of sources other than the textbook without citation, including other books and the World Wide Web, will be viewed as plagiarism. (If you're unsure of what constitutes plagiarism, consult the links on my home page.)
- Some of the materials in this course are possibly copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of this course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the TEACH Act (2002).

In-Class Conduct During Lectures

- Students are expected to attend all class meetings prepared (i.e. carrying the textbook, note paper, writing instruments, etc.) and participate. You may be dropped from this course and receive an "F" on your transcript for repeated absences (BOT Rule 3359-20-05D, effective 2/14/2013).
- All cell phones, pagers, beepers, etc., are to be turned off or switched to manner mode during class. Portable computers will be permitted until this privilege is abused.

In-Class Quizzes

- Written resources (i.e. textbook and printed notes) may be used during in-class quizzes; *electronic ones may not*. In-class quizzes may not be made up if absent, late or unprepared.
- Students have one week from the return of a graded quiz to seek corrections from me regarding grading; after that no changes will be made to scores.

In-Class Exams

- The use of electronic devices is forbidden during in-class exams. Food and drink are also banned.
- Students who leave the room during an exam, or who use electronic devices during an exam, may not continue working on that exam.
- Make-up exams will be given only under extraordinary circumstances. Arrangements should be made prior to the exam and proof furnished.
- Students have one week from the return of a graded exam to seek corrections from me regarding grading; after that no changes will be made to scores.

Homework and Programming Assignments

- There will be no extra credit assignment or do-overs so don't even ask.
- Homework assignments and projects are to be submitted electronically in the manner specified in class. Submissions to my personal e-mail account will be ignored.
- Late assignments will be accepted but penalized according to the following scale: 10% penalty for one calendar day late, 25% for 2, 50% for 3, 75% for 4, and 100% (i.e. no credit) for 5 calendar days (i.e. one week) late. An exception will be made only for medical emergencies.
- All programming assignments must be completed within 10 calendar days of the original due dates in order to be eligible for a passing grade.
- All programming assignments will be graded according to how well they execute on the computers in CAS 241 or 254. It is your responsibility to check your work on our equipment prior to submission.
- All class assignments must be submitted by 5:00 PM on **Friday December 2**. Nothing will be accepted after this time.
- Students have one week from the return of a graded assignment to seek corrections from me regarding grading; after that no changes will be made to scores.

Special Instructions

The COVID-19 pandemic is still present and serious. Before entering class, you should have completed your daily health assessment. You should not come to class if you fail your health check or feel ill. At that time, I also ask you notify me that you will be absent. When campus policies require masks to be worn indoors, all students are required to wear a mask during in-person classes. While you are in class on campus, you are required to: always cough or sneeze into your elbow or a tissue and adhere to other public safety protocols and directives for your specific classroom/lab/studio. Students who do not follow these health and safety requirements will be instructed to leave class immediately. Students who violate this protocol will need to leave the classroom and MAY be marked absent. Repeated violations of these health-saving protocols may lead to sanctions under the Student Code of Conduct up to and including suspension or expulsion. Current guidelines can be found at: uakron.edu/return-to-campus/.

Respondus

I expect to use the Respondus lockdown browser for the final exam. Make sure you have a computer with a web cam before then. Details will be forthcoming.

Other

Familiarize yourself with the content at

https://www.uakron.edu/oaa/faculty-affairs/what-students-need-to-know

regarding accessibility, Title IX and sexual harassment and violence.

DISCLAIMER: Save for changes that substantially affect implementation of the evaluation (grading) statement, this document is a guide for the course and is subject to change with advance notice.