Department of Electrical and Computer Engineering

COURSE OUTLINE

CENG 453/ELEC 553 – Introduction to Parallel and Cluster Computing

Term - SPRING 2015 (201501)

Instructor

Dr. Nikitas Dimopoulos
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Office Hours

Days: MR
Time: 14:45-15:45
Location: EOW 437

Lectures

A-Section(s): A01 / CRN 20373
A02 / CRN 20374
ELEC 553 A01 / CRN 21130
Days: MR
Time: 13:00-14:20
Location: CLE A205

Labs **Location: ELW**

B-Section(s): Days: Time(s):

Required Text

Title: Parallel Programming in C and OpenMP
Author: M. J. Quinn
Publisher: McGraw Hill
Year: 2004

Optional Text

Title:
Author:
Publisher:
Year:

References: Class notes http://www.ece.uvic.ca/~ceng453

Assessment:

	CENG 453	ELEC553	
Assignments:	10%	5%	
Project		10%	
Midterm	35%	30%	Date: Monday, February 16, 2015
Final	55%	55%	

Note: Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

Due Dates for Assignments:

TBD

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

Passing Grades	Grade Point Value	Percentage for Instructor Use Only	
A+ A A-	9 8 7	90 – 100 85 – 89 80 – 84	
B+ B B-	6 5 4	77 – 79 73 – 76 70 – 72	
C+ C	3 2	65 – 69 60 – 64	
D	1	50 – 59	
Failing Grades	**Grade Point Value**	**Percentage for Instructor Use Only**	**Description**
E	0	0 - 49	Fail, *Conditional supplemental exam. (For undergraduate courses only)
F	0	0 – 49	Fail, no supplemental.
N	0	0 – 49	Did not write examination, Lab or otherwise complete course requirements by the end of term or session; no supplemental exam.

**Assignment of E grade will be at the discretion of the Course Instructor.*

The rules for supplemental examinations are found on page 80 of the current 2014/15 Undergraduate Calendar.

Term in which E Grade Was Obtained	Application Deadline for Supplemental Exam	Supplemental Exam Date
First term of Winter Session (Sept – Dec)	February 28 in the following term	First week of following May
Second term of Winter Session (Jan – Apr)	June 30 in the following term	First week of following September
Summer Session (May – Aug)	October 31 in the following term	First week of following January

Deferred exams will normally be written at the start of the student's next academic term; i.e., approximately 4 months following the deferral of the exam.

Course Description

Course Objectives

The focus of the course is to explore the programming practices for clusters (and High Performance Computers).
This will be accomplished through the use of the two prevailing standard environments i.e. MPI (Message Passing Interface) and OpenMP. We will study fundamental algorithms and their parallel implementations.
You will be gaining hands-on experience on a cluster environment (4-node/32-core Intel Xeon X5520 system)

Learning Outcomes

The student will be able to analyze a problem and devise a parallel solution.
The student will be able to program the solution devised using MPI or OpenMP.
The student will be able to establish the performance of the solution obtained and determine how it scales with the number of processor cores involved.

Syllabus

- Preliminaries. The space of high performance computers
- Clusters. Commodity nodes and interconnection network strategies. Why performance depends on interconnections
- Programming. MPI and OpenMP. Develop programming skills through a number of applications.
- Partition, data decomposition, communication, granularity.
- The Sieve of Eratosthenes (finding prime numbers)
- The shortest-path problem
- Linear algebra (matrix-vector, matrix-matrix multiplication, linear systems)
- Monte Carlo Methods
- Finite Difference Methods
- Fast Fourier Transform
- GPGPU computing (time permitting).

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the ECE Chair by email or the ECE Chair's Secretary eceasst@uvic.ca to set up an appointment.

Accommodation of Religious Observance

See http://web.uvic.ca/calendar2014/GI/GUPo.html

Policy on Inclusivity and Diversity

See http://web.uvic.ca/calendar2014/GI/GUPo.html

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult

http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.