ECE 718 / Special Topics in Computation

Hyperdimensional Computing

COURSE OUTLINE

CALENDAR DESCRIPTION

This special topic course explores the computational challenges in hyperdimensional computing.

SCHEDULE

Lectures: Thursdays from 5:30 p.m. – 7:30 p.m. in ITB A113B

Assignments and project work will be done in a combination of modelling languages (e.g., Python), procedural languages (e.g., C) and hardware description languages (e.g., Verilog).

INSTRUCTOR

Dr. N. Nicolici
Email: nicolici@mcmaster.ca
Office: ITB/A210
Phone: 905-525-9140 ext. 27598
Office Hours: by appointment

COURSE WEBSITE/S

We will use GitHub to distribute/submit the assignments/project material. Some slides and support material will be distributed through OneDrive. Other than live communication during class time, the "digital" communication will be via email.

COURSE OBJECTIVES

By the end of this course, students should be able to:
- Understand the fundamentals of hyper-dimensional computing (HDC)
- Evaluate models and implementation choices that can bridge HDC theory to practice

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ASSUMED KNOWLEDGE

- Proficiency in the design and implementation of both computer hardware and software algorithms, in particular, understanding how to explore and evaluate design trade-offs

COURSE MATERIALS

Textbooks:

There is NO textbook used in this course. The main sources of information will be assigned readings from the literature, lectures, assignments and project material.

COURSE OVERVIEW

Week	Topic
1-3	HDC fundamentals
4-6	HDC models and applications
7-13	HDC implementation challenges

At certain points in the course, it may make good sense to modify the schedule. The instructor may modify elements of the course and will notify students accordingly (in class or via email).

ASSIGNMENTS OVERVIEW

Week	Topic
1-3	Introductory assignment on HDC fundamental operations
4-6	Modelling and programming assignments on HDC models and applications
7-13	Project on the evaluation of implementation trade-offs for HDC computational challenges

ASSESSMENT

Component	Weight	Due Date
Paper presentations	20 %	(10% for each of the two presentations in June/July)
Programming assignments	30 %	(10% percent for each assignment in May/June)
Project code and report	40 %	(the project will be done from mid-June to late-July)
Project presentation	10 %	(to be presented in the first week of August)
Total	100 %	

CONDUCT EXPECTATIONS

As a McMaster graduate student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the *Code of Student Rights & Responsibilities* (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

ACADEMIC ACCOMMODATIONS OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's *Academic Accommodation of Students with Disabilities* policy.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office **normally within 10 working days** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

RESEARCH ETHICS

The two principles underlying integrity in research in a university setting are these: a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities. Any departure from these principles will diminish the integrity of the research enterprise. This policy applies to all those conducting research at or under the aegis of McMaster University. It is incumbent upon all members of the university community to practice and to promote ethical behaviour. To see the Policy on Research Ethics at McMaster University, please go to http://www.mcmaster.ca/policy/faculty/Conduct/ResearchEthicsPolicy.pdf.

www.eng.mcmaster.ca/ece