University of Waterloo
Psychology
PSYCH 420/792
Intro to Comp Neuro Methods
Winter 2014
3:30 – 6:20 pm Tuesday, ML117

Instructor and T.A. Information

Instructor: Britt Anderson
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Office Hours: Monday 11:30 – 12:30
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Course Description

The course introduces methods and procedures used in the modelling of neural and cognitive processes. This requires getting familiar with some concepts and notation from mathematics, and some familiarity with how to simulate things on a computer – which we can do with a spreadsheet program. This course is intended for two types of students: one knows psychology, but little to no math; the other knows maths (or engineering, computer science, etc), but has little psychology. The course structure and level is weighted towards the former, but some students in the second category may find it useful, and their presence certainly helps students in the former group. As long as you are willing to work hard you will succeed, and you will get a grade that you are happy with. I have taught the course several times now, and there has never been a student who could not get the basic concepts and earn a respectable mark. However, saying that is not the same as saying the course is easy. The course may require you to push yourself into areas where you are not
confident or comfortable, and it may take a lot of time.

Course Goals and Learning Outcomes

The course is organized around topics.

A. Why Model?
    - We begin with reading and discussion to understand better the purpose and limits of this pursuit.
B. Build a neuron
    - We learn about differential equations so that we can,
    - Implement the Integrate and Fire and Hodgkin & Huxley neuron models
C. Simple neural networks
    - Some basic linear algebra is introduced so that we can,
    - Implement a perceptron and Hopfield Network
D. If we have time we can
    - Explore probability as a clue to modeling reaction time
    - Use logic to build simple cognitive architectures

- Explore the world of agent based modelling

E. Present a final modelling project.
   - This will often be done in small groups (though individual presentations are an option).
   - Netlogo has been a popular format for these explorations, but presentations using other methods and topics are considered, but need my approval.

Text

- I have written a textbook that closely follows this course. It is not required, but may be useful as a reference for some, and it will cover material we probably do not have time to get to. It should be in the bookstore by February.

Readings Available on LEARN

- If I assign a pdf for reading, I will generally place a link to the original article on learn .

Course Requirements and Assessment

There will usually be a weekly assessment to be done outside of class and submitted in a dropbox on learn.

Information on Plagiarism Detection

Description of software used to detect plagiarism.

Electronic Device Policy

Instructor's policy on electronic devices.

Attendance Policy

Points are lost for missing class without approval.

Institutional-required statements for undergraduate course outlines approved by Senate Undergraduate Council, April 14, 2009

Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. See the UWaterloo Academic Integritity Webpage (https://uwaterloo.ca/academic-integrity/) and the Arts Academic Integrity Office Webpage (http://arts.uwaterloo.ca/current-undergraduates/academic-responsibility) for more information.

Discipline

A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline

(http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm). For typical penalties check Guidelines for the Assessment of Penalties (http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm).

Grievance

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4 (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70). When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Appeals

A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals (http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm).

Note for Students with Disabilities

The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.