

# Syllabus Psych 420 Intro Comp Mod Psychology Students

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# 1 Instructor Information

Instructor: Britt Anderson

Office: PAS 4039 -or- E7 6328

Office Hours: email to arrange virtual office hour

Phone: never checked; just **email** (alternate contacts include an issue on the course github (not LEARN) site - see below).

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# 2 Course Description

## 2.1 Brief Description

An introduction to the basic elements of computational modeling with an emphasis on psychology students.

Date: Thursday

Time: 14:30-17:20

Location: Initially on Zoom, then hopefully QNC 2501

## 2.2 Goals

1. You will understand the scope of subject topics and methodological tools that comprise computational neuroscience and computational cognitive modeling
2. You will learn the skills necessary to program a spiking neuron model, and have a general understanding of the mathematics behind it (differential equations).
3. You will learn the skills necessary to code a simple neural network, and have a general understanding of the mathematics behind it (linear algebra).
4. We may, given time, cover an additional topic or two, but we will always conclude with the goal of you...
5. Using your burgeoning skills to collaborate in a group to program a simple model of something neurological or psychological and provide supporting background material as to why this project is apt for a modeling approach.

## 2.3 Text

This is no required text for this course, but much of the material was covered to some extent in my book that you can find online through the library:

Computational neuroscience and cognitive modelling a student's introduction to methods and procedures

Most of material that students need can be found in the course github repository: Comp-Neuro-420. Make sure you track the "lisp" branch.

## 2.4 Requirements and Assessments

### Special Requirements

Because we are, at least in the beginning, in a virtual setting it will be imperative that attend all classes, and participate in the in-class activities.

This will require having a functioning:

- laptop on which they can install software
- using the zoom application to be able to view multiple screens and share their own screen
- a reliable internet connection with a camera, sound, and microphone that will be left on by default.

## 2.5 Graded Assignments

These will take two forms: regular exercises and a final project.

### 2.5.1 Regular Exercises.

These are short in-class presentations on particular topics that will be assigned in real time. There will also be homework exercises to be done in the time between course sessions. These will be turned in a dropbox on Learn. We will generally only use Learn for this sort of administrative function. I will expand this list, but for now, and given the uncertainty of our meeting conditions it will remain partial.

### 2.5.2 Final project

The course is about acquiring familiarity with the tools and methods useful for computational modeling as a research technique in the neurosciences and cognition. The final project will include the following components:

- selection of an article in the research literature using a particular computational tool or procedure
- a summary of the math behind that tool (not a proof; not mastery - just an accessible summarization for the non-expert)
- a summary of the tool (it might be a program, a programming language, or actual math)
- an, at least minimal, example of the tool. The usual example is a small program running a toy example, but other forms of demonstration will be considered.
- the work is typically done in a small group, but individual projects can be selected if preferred. It is just means more work usually, and slightly less learning since you do not get others' perspectives.
- The typical submitted form of the project is a written report, but in these days of on-line teaching and learning a video report could be negotiated. In all cases the code in a form that I can run and test must be submitted.

### 2.5.3 Extra Credit

Extra credit via the Sona route is available, but frankly I don't think is really that necessary. As we are thinking about experiments and data the participation in on-line research could be a good learning experience. If you are doing this and are forced into an on-line testing situation, which features work and don't work so well for data collection by this route? Use your SONA participation as a route to learning for your own future research. Now follows the boiler plate.

#### 1. Sona Participation and Research Experience Marks

- Information and Guidelines Experiential learning is considered an integral part of the undergraduate program in Psychology. Research participation is one example of this, article review is another. A number of undergraduate courses have been expanded to include opportunities for Psychology students to earn grades while gaining research experience.

Since experiential learning is highly valued in the Department of Psychology, students may earn a "bonus" grade of up to 3% in this course

through research experience. Course work will make up 100% of the final mark and a "bonus" of up to 3% may be earned and will be added to the final grade if/as needed to bring your final grade up to 100%.

The two options for earning research experience grades; participation in research through online and remotely operated (replacing in-lab) studies, and article review; are described below. Students may complete any combination of these options to earn research experience grades. Option 1: Participation in Psychology Research

Research participation is coordinated by the Research Experiences Group (REG). Psychology students may volunteer as research participants in remotely operated (replaces in-lab) and/or online (web-based) studies conducted by students and faculty in the Department of Psychology. Participation enables students to learn first-hand about psychology research and related concepts. Many students report that participation in research is both an educational and interesting experience. Please be assured that all Psychology studies have been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

How to earn extra marks for your Psychology course(s) this term by participating in studies ...

- You will earn "credits" which will be converted to "marks" (1 credit = 1%)
- You can schedule your remotely operated (replacing in-lab) and ONLINE studies using the "Sona" website.
- FOR THE WINTER 2022 TERM ALL OF YOUR CREDITS can be earned through ONLINE AND REMOTELY/ ONLINE OPERATED (replacing in-lab) studies. This could change as advice on in lab studies progresses.
- tional focus of participation in research
- ximize the educational benefits of participating in research, students will receive feedback information following their participation in each study detailing the following elements:
  - Purpose or objectives of the study
  - Dependent and independent variables
  - Expected results
  - References for at least two related research articles

- Provisions to ensure confidentiality of data
- Contact information of the researcher should the student have further questions about the study
- Contact information for the Director of the Office of Research Ethics should the student wish to learn more about the general ethical issues surrounding research with human participants, or specific questions or concerns about the study in which s/he participated.

Participation in remotely operated (replaces in-lab) studies has increment values of 0.75 participation credits (grade percentage points) for each 30-minutes of participation. Participation in ONLINE studies is worth .25 credits for each 15-minutes of participation. Researchers will record students participation and at the end of the term the REG Coordinator will provide the course instructor with a credit report of the total credits earned by each student.

How to participate?

Study scheduling, participation and grade assignment is managed using the SONA online system. All students enrolled in this course have been set up with a SONA account. You must get started early in the term.

For instructions on how to log in to your SONA account and for a list of important dates and deadlines please, as soon as possible, go to: Participating/SONA information: How to log in to Sona and sign up for studies

*Please do not ask the Course Instructor or REG Coordinator for information unless you have first thoroughly read the information provided on this website.*

More information about the REG program in general is available at:

Sona Information on the REG Participants website or you can check the Sona FAQ on the REG website homepage for additional information.

Option 2: Article Review as an alternative to participation in research Students are not required to participate in research, and not all students wish to do so. As an alternative, students may opt to gain research experience by writing short reviews (1; to 2 pages) of research articles relevant to the course. The course instructor will specify a

suitable source of articles for this course (i.e., scientific journals, newspapers, magazines, other printed media). You must contact your TA to get approval for the article you have chosen before writing the review. Each review article counts as one percentage point. To receive credit, you must follow specific guidelines.

The article review must:

- Be submitted before the last day of lectures. Late submissions will NOT be accepted under ANY circumstances.
- Be typed
- Fully identify the title, author(s), source and date of the article. A copy of the article must be attached.
- Identify the psychological concepts in the article and indicate the pages in the textbook that are applicable. Critically evaluate the application or treatment of those concepts in the article. If inappropriate or incorrect, identify the error and its implications for the validity of the article. You may find, for example, misleading headings, faulty research procedures, alternative explanations that are ignored, failures to distinguish factual findings from opinions, faulty statements of cause-effect relations, errors in reasoning, etc. Provide examples whenever possible.
- Clearly evaluate the application or treatment of those concepts in the article.
- Keep a copy of your review in the unlikely event we misplace the original.

## 2.6 Schedule

Week	Date	Topic	General
1	Jan 6	Intro	
2	Jan 13	DE/Spikes 1	
3	Jan 20	DE/Spikes 2	
4	Jan 27	DE/Spikes 3	
5	Feb 3	Lin Alg/Neural Networks	
6	Feb 10	Lin Alg/Neural Networks	
7	Feb 17	Lin Alg/Neural Networks	
8	Feb 24	Reading Week	
9	Mar 3	Lin Alg/Neural Networks	
10	Mar 10	Buffer*	
11	Mar 17	Buffer*	
12	Mar 24	Final Proj	
13	Mar 31	Final Proj	

- If we have time I have other modules I can slot in here, but if we don't then we can spill into these slots from the earlier components.

## 2.7 Late work

Can't give credit for things that are not turned in. I will give you deadlines to try and help you keep from getting stuck or procrastinating, but I will look at anything you turn in, so turn in something.

## 2.8 Plagiarism Software - none

## 2.9 Electronic Device - use any and all

## 2.10 Attendance

You need to come every week, because otherwise you sabotage the learning. This is not a class with a bunch of outside readings or things to memorize. This is a course based on doing, and often you will learn more from interacting with your peers than from the "raw" material I dispense. If you are not attending class (even when it is virtual) you will lose out. This not some huge class. Interaction will be possible if you attend.

## 2.11 Syllabus Boilerplate



### **2.11.1 Academic Integrity:**

In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.

### **2.11.2 Discipline:**

A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (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. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 - Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline.

### **2.11.3 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.

### **2.11.4 Appeals:**

A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals.

Other sources of information for students Academic integrity (Arts) Academic Integrity Office (uWaterloo)

### **2.11.5 Accommodation for Students with Disabilities**

Note for students with disabilities: The AccessAbility Services office, 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 AS office at the beginning of each academic term.