Psychology 390/392 section 004 Research in Human Cognitive Neuroscience, Winter 2020

Location: PAS 2259

Time: Tue 10:30-12:20, Thur 10:30- 12:20

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Instructor: Professor Mike Dixon   office: PAS 4035

tel 519 888 4567 32877   office hours: by appointment (held in PAS 2259)
(email me or see me in class)

email mjdixon@uwaterloo.ca

T.A.   Tyler Kruger

office hours: by appointment (held in PAS 2259)

email Tyler Kruger <tbkruger@uwaterloo.ca>   (contact Tyler by email)

Course is listed on Desire to Learn
 https://learn.uwaterloo.ca

Expanded Course Description

This course is a lab course that will introduce students to some of the techniques used in conducting experiments in human cognitive neuroscience with a particular emphasis on psychophysiology. Students will be taught how to program a simple experiment and accurately acquire response time data. They will be taught how to gather a number of psychophysiological measures. The psychophysiological measures acquired will reflect brain-body relationships e.g., how psychological reactions can influence heart rate, and changes in skin conductance (i.e., sweat increases or decreases related to the processing of external information). Students will be taught how to apply these different measures to conduct research in a number of diverse areas including a slot machine simulator, video game playing, and distortions of body schema. Students will gain experience by collecting data on themselves and their lab team members (the data is solely for educational purposes not for formal research).

      This course is first and foremost an experiential learning course where students will learn by doing. Due to Covid-19 students will integrate the different types of knowledge they gained across the different laboratories. They will reanalyse a series of student's data from laboratory 1, but using the methods that they learned in laboratory 4. They will be introduced to how to extract different text strings in excel in order to extract the relevant data. They will use this new skill in combination with their previous learning to be able to correctly calculate means of the different conditions that have been correctly trimmed

using the outlier extraction technique outlined by Van Selst and Jolicouer. They will also learn a new skill concerning how to apply standard error of the mean bars to their graphs – a requisite for any published paper.

Course Requirements and Evaluation: 5 Labs

Marks in this course will be based on 4 labs (lab 1 = 10% lab 2 = 20%, lab 3 = 10%, and lab 4 = 20%), and a final lab in which you will consolidate learning from labs 1 and 4 (40%). All labs and the final report will be submitted via electronic drop boxes on the *Learn* site.

A note on Late Labs. All late Reports will be penalized. For every day that an assignment is late, 10% will be deducted from your assignment grade. For example, if you received 100% on lab report 1 but handed it in two days late you would receive 80% on this lab.

LABS:
10%   **Laboratory Report 1:** Students will work in pairs and learn to program in SuperLab. Each student will submit via *Learn*'s electronic dropbox, a program that they have created using SuperLab, along with an excel workbook containing both raw and analyzed response time and error data.   Part of Lab 1 will involve answering a short answer quiz on LEARN.

20%   **Laboratory Report 2:** Students will work in teams of 5 or 6. Each member of the team will record their heart rate, filter their heart rate, and record beats per minute as they play a simple (non-violent) video game. Using Powerlab and "LabChart" software students will then learn to analyze their heart rate and graph the results in Excel. Then each team member will write up their own individual APA-formatted Method Section outlining the apparati and procedures used in the video game study. Finally, they will analyse the data on the vagal tone changes of a person (me!) at rest, and under mental stress. Files for the video game (Chart and Excel), word files for the method section, and excel files for the vagal tone analysis will be submitted via the electronic dropbox on *Learn*.

10%   **Laboratory Report 3:** Students will work in teams of 5 or 6. Using Powerlab and LabChart software students will record Skin Conductance Responses for an experiment involving an illusion involving a distortion of body schema (the "rubber hand" illusion). Each student will submit via electronic dropbox on *Learn*, the LabChart files which they recorded and an excel file summarizing their results. They will also complete a short-answer quiz as part of this lab.

20%   **Laboratory Report 4:** Students will learn more complex data analytic techniques involving analyzing the physiological responses of people playing on a slot machine simulator. Students will learn how to analyze event-related individual psychophysical responses to wins, losses, and a special type of slot-machine loss called a "near miss". Each student will submit via *Learn's* electronic dropbox the LabChart files they analysed and an excel file with the relevant data analyses.

40% Laboratory 5 Worth 40% of student's mark.

Due to Covid-19 students will work remotely using excel. They will reanalyse a series of student's data from laboratory 1, but using the methods that they learned in laboratory 4. They will be introduced to how to extract different text strings in excel in order to extract the relevant data. They will use this new skill in combination with their previous learning to be able to correctly calculate means of the different conditions that have been correctly trimmed using the outlier extraction technique outlined by Van Selst and Jolicouer. They will also learn a new skill concerning how to apply standard error of the mean bars to their graphs – a requisite for any published paper.

Schedule of Topics

Note: All readings will be available within *Learn*. As mentioned all submissions will be via electronic drop box in *Learn*.

Jan 7   Overview of Research in Human Cognitive Neuroscience

- Cognitive Neuroscience using behavioural measures

Jan 9   Overview of Superlab

Reading: Dixon M. J., Smilek, D., Cudahy, C., Merikle, P.M. (2000)
   Five plus two equals yellow *Nature,* 406, 365.

- programming a Stroop Experiment
- running a Stroop Experiment

Jan 14 Analyzing the data, outlier trimming and rudimentary data analysis/summarization using Microsoft Excel.

Jan 16- Intro to LABORATORY 1 - Strategic and Automatic Influences on Stroop Performance

Jan 16 -   LABORATORY 1 in class data collection and analysis.

Jan 21 -   LABORATORY 1 in class data collection and analysis.

Jan 23 -   Finish LABORATORY 1 complete in-class work on data analysis and short answer quiz

DEADLINE: Laboratory 1 must be submitted by Jan 23 (at or before 11:59 p.m.)

Jan 28

Reading: John L Andreassi, J.L. (2000). Heart Activity and Behavior I: Developmental Factors, Motor and Mental Activities, Perception, Attention, and Orienting Responses. Chapter In <u>Psychophysiology: Human Behaviour and Physiological Response</u>. Lawrence Erlbaum Associates, London

Reading: Laborde, S., Mosley, E., Thayer, J.F. (2017) Heart rate variability Heart Rate Variability and Cardiac Vagal Tone in Psychophysiological Research – Recommendations for Experiment Planning, Data Analysis, and Data Reporting, Frontiers in Psychology, 2

- Psychophysiology of the human heart
- Introduction to Powerlab

Jan 28
- Introduction to LabChart Software

Jan 30

LABORATORY 2 Heart Rate Responses to Playing a Video Game (Tonic effects), and Heart Rate Changes under Mental Stress (Phasic effects)

- Reading: Turner, R. J., Carroll, D. and Courtney, H. (1983). Cardiac and metabolic responses to space invaders: An instance of metabolically-exaggerated cardiac adjustment? *Psychophysiology, 20,* 544-549.

Feb 4
  - LABORATORY 2 data collection and analysis for Laboratory 2.

Feb 6
  - LABORATORY 2 data analysis and completion of Laboratory 2.

DEADLINE: Laboratory 2 must be submitted by Feb 6th (at or before 11:59 p.m.)

Feb 11
Introduction to electrodermal measures, and recording of skin conductance levels and skin conductance responses (SCRs) using Powerlab.

Reading: Dawson, M.E., Schell, A.M., and Filion, D. (2007). The Electrodermal System. In Handbook of Psychopysiology, 3RD Edition, (J.T. Cacioppo, L.G. Tassinary, G.G. Bernston Eds.), Cambridge University Press.

Reading Armel, K.C., and Ramachandran, V. S. (2003). Projecting sensations to external objects: Evidence from skin conductance response. *Proceedings of the Royal Society, B: Biological Sciences, 270,* 1499-1506.

LABORATORY 3 - The rubber hand illusion

Feb 13   Data collection and analysis of Laboratory 3.

Feb 25   LABORATORY 3 - Completion of analysis for Laboratory 3.

DEADLINE: Laboratory 3 must be submitted by Feb 25 (at or before 11:59 p.m.)

Feb 27   Introduction to Macros in LabChart

        LABORATORY 4 Analyzing Slot Machine Outcomes: Wins, Losses and Near Misses.

        Readings: Dixon, M.J., MacLaren, V., Jarick, M., Fugelsang, J.A., and Harrigan, K.A. (2013). The Frustrating effects of just missing the jackpot: Slot machine near-misses trigger large skin conductance responses, but no post-reinforcement pauses. *Journal of Gambling Studies, 29,* 661-674. doi: 10.1007/s10899-012-9333-x*.*

        Dixon, M.J., Larche, C.J., Stange, M., Graydon, C. & Fugelsang, J.A. (2017). Near-Misses and Stop Buttons in Slot Machine Play: An Investigation of How They Affect Players, and May Foster Erroneous Cognitions, *Journal of Gambling Studies.*

Mar 3   - LABORATORY 4 - Data Analysis for Laboratory 4.

Mar 5   - LABORATORY 4 - Data Analysis for Laboratory 4.

Mar 10   - LABORATORY 4 - Data Analysis for Laboratory 4.

DEADLINE: Laboratory 4 must be submitted Mar 10 (at or before 11:59 p.m.)

DEADLINE: 1 Page Proposal for the final paper must be submitted Mar 10 (at or before 11:59 p.m.)

Mar 12   Begin Work on student projects

March 17,19. (Classes cancelled due to Covid-19)
March 24,26,31, April 2   At home work on final lab

DEADLINE: FINAL Labs due in exam period on APRIL 16th (at or before 11:59 p.m.)

The Information That Appears on All Course Syllabi…

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. See the Office of Academic Integrity webpage for more information.

Discipline

A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. Check the Office of Academic Integrity for more information. 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. For typical penalties check Guidelines for the Assessment of Penalties.

Concerns about a Course Policy or Decision

Informal Stage. We in the Psychology Department take great pride in the high quality of our program and our instructors. Though infrequent, we know that students occasionally find themselves in situations of conflict with their instructors over course policies or grade assessments. If such a conflict arises, the Associate Chair for Undergraduate Affairs (Richard Eibach) is available for consultation and to mediate a resolution between the student and instructor: Email: reibach@uwaterloo.ca; Ph 519-888-4567 ext. 38790

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. When in doubt, please be certain to contact Richard Eibach, the Associate Chair for Undergraduate Affairs who will provide further assistance; reibach@uwaterloo.ca.

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.

Note for Students with Disabilities

The AccessAbility Services office, located on the first floor of the Needles Hall extension (NH 1401), 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 AccessAbility Services at the beginning of each academic term.

Accommodation for course requirements for Psychology courses.

Policies of the Psychology department pertaining to course requirements are available on the [department website](#)*.*

Mental Health Support
All of us need a support system. The faculty and staff in Arts encourage students to seek out mental health support if they are needed.
On Campus
• Counselling Services: counselling.services@uwaterloo.ca / 519-888-4567 ext. 32655
• [MATES:](#) one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services
• Health Services Emergency service: located across the creek form Student Life Centre

Off campus, 24/7
• [Good2Talk:](#) Free confidential help line for post-secondary students. Phone: 1-866-925-5454
• Grand River Hospital: Emergency care for mental health crisis. Phone: 519-749-4300 ext. 6880
• [Here 24/7](#): Mental Health and Crisis Service Team. Phone: 1-844-437-3247
• [OK2BME:](#) set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Full details can be found online on the Faculty of Arts [website](#)
Download [UWaterloo and regional mental health resources (PDF)](#)
Download the [WatSafe app](#) to your phone to quickly access mental health support information

Territorial Acknowledgement

We acknowledge that we are living and working on the traditional territory of the Attawandaron (also known as Neutral), Anishinaabe and Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes ten kilometres on each side of the Grand River.