Psychology 392 Research in Human Cognitive Neuroscience, Spring 2011

Location: PAS 2259

Time: Tues 8:30-10:20, Thursday 8:30- 10:20

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Instructor: Professor Mike Dixon office: PAS 4035

tel 519 888 4567 32877 office hours: by appointment (held in PAS 2259)
Wednesday 8:30 10:20

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T.A. Jennifer Tomaszczyk office hours: held in PAS 2259
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Course is listed on UW ACE
https://uwangel.uwaterloo.ca/uwangel/default.asp
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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. 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. In this course the psychophysiological measures will focus primarily on psychological influences on heartbeat, and psychological 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. After being introduced to the theory and practice of these experimental techniques (and completing labs to solidify their learning), students will be asked to work in small teams, program their own experiments, and collect sample data on themselves and team members and write up a final report on their self-generated project.

Course Requirements and Evaluation: 4 Labs and a Final Report

Marks in this course will be based on 4 labs (10% for labs 1, 2, 3 and 20% for lab 4), and the final project report (50%). All labs and the final report will be submitted via electronic drop boxes on UW-ACE.

LABS:

10% **Laboratory Report 1:** Students will work in pairs and learn to program in SuperLab. Each student will submit a program that they have created using SuperLab, along with an excel workbook containing raw and summarized response time and error data.

10% **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 Chart 7.0 software students will then learn to analyze their heart rate and graph the results in Excel. In addition they will record inter-beat intervals of a participant anticipating a burst of white noise.

10% **Laboratory Report 3:** Students will work in teams of 5 or 6. Using Powerlab and Chart 7.0 software students will record Skin Conductance Responses) for an experiment involving an illusion involving a distortion of body schema (the rubber hand illusion).

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 type of slot-machine loss called a "near miss".

Final Report - Worth 50% of student's mark.

Students will work in pairs or teams of three. Each student will create an experiment in SuperLab, interface the experiment with Powerlab, and collect sample data using either heart rate, or skin conductance as the dependent variables. Each student will: write a 250 word abstract, write a brief (4 page double spaced) introduction summarizing research on their topic, write a 3-4 page method section, write a 2-page results section summarizing their findings, and a 4-page discussion, followed by references in APA format. Before conducting their experiments all projects must be approved by Dr. Dixon or by the T.A. A one-page proposal must be submitted for approval prior to any programming or data collection. This proposal is due on June 30th. The final lab report is due in the exam period on Aug 5th.

A note on collaboration. Although team members should consult with one another, agree on a project, and work together on this project, each individual student will submit their own proposal and their own final report about this agreed upon project.

Here are some possible experiments.

1. Electrodermal and heart rate responses to different types of video-games (strategic vs, racing) video games NB games must be non-violent.
2. Electrodermal and heart rate responses to happy and sad movie clips.

3. Psychophysical responses to faces showing positive and negative (angry) faces.
4. Psychophysical responses to classically conditioned stimuli.
5. Psychophysical responses to familiar and unfamiliar faces.
6. Lie detection.
7. SCR and Heart Rate reactions to frustration
8. SCR and Heart Rate responses to different types of music.

A note on Powerlab and the Imacs. Each powerlab system costs in excess of $8000. The IMacs cost $1,300 each. Treat them with extreme care. NO FOOD OR DRINKS ARE ALLOWED IN THE LAB ROOM.

Schedule of Topics

Note: All readings will be available via downloads information will be provided within UW ACE. Also all submissions will be via electronic drop box in UW ACE.

May 3th Overview of Research in Human Cognitive Neuroscience

- Cognitive Neuroscience using behavioural measures

May 5th 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

May 10th - Analyzing the data, outlier trimming and rudimentary data analysis/summarization using Microsoft Excel.

May 12th
Intro to LABORATORY 1 - Strategic and Automatic Influences on Stroop Performance

May 17 - LABORATORY 1 in class data collection and analysis.

May 19st - Finish LABORATORY 1 complete in class work on data analysis.

DEADLINE: Laboratory 1 must be submitted by May 19th

May 24th
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 Psychophysiology: Human Behaviour and Physiological Response. Lawrence Erlbaum Associates, London

- Psychophysiology of the human heart
- Introduction to Powerlab

May 26th

- Introduction to Using Chart Software

May 31st

LABORATORY 2 Heart Rate Responses to playing a video game (Tonic effects), and Heart Rate Changes in Anticipation of a loud Noise (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.

June 2th

- LABORATORY 2 data collection and analysis for Laboratory 2.

June 7th

- LABORATORY 2 data analysis and completion of Laboratory 2.

DEADLINE: Laboratory 2 must be submitted by June 7th

June 9th

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

June 14 th Data collection and analysis of Laboratory 3.

June 16st LABORATORY 3 - Completion analysis of Laboratory 3.

DEADLINE: Laboratory 3 must be submitted by June 16th

June 21st Introduction to Macros in Chart 7.0

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

Reading: Dixon, M.J., Harrigan, K.A., Jarick, M., Maclaren, V., Fugelsang, J.A., and Sheepy, E. (2011 submitted). Psychophysical arousal signatures of near-misses in slot machine play. Submitted to International Gambling Studies.

June 23rd - LABORATORY 4 - Data Analysis for Laboratory 4.

June 28th - LABORATORY 4 - Data Analysis for Laboratory 4.

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DEADLINE: Laboratory 4 must be submitted by June 28th

DEADLINE: 1 Page Proposal for the final paper due. June 30th

July 5th Begin Work on student projects

July 7th 12th, 14th, 19th, July 21st In-class work on the student projects.

DEADLINE: August 5th FINAL REPORTS DUE

The Information That Appears on All Course Syllabi…

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.

Concerns About the Course or Instructor (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 (Dr. Colin Ellard) is available for consultation and to mediate a resolution between the student and instructor. Dr. Ellard? contact information is as follows:

Email: cellard@uwaterloo.ca
Ph 519-888- 4567 ext 36852

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. See Policy 70 and 71 below for further details.

Academic Integrity:

- **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.
- **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 ?ulesfor 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, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.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, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm
- **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, http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm
- **Academic Integrity website (Arts):** http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html
- **Academic Integrity Office (UW):** http://uwaterloo.ca/academicintegrity/

For further advice from the Faculty of Arts on the avoidance of academic offenses, see the following website:
http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html