Psychology 465A (3 credits)
Computers in Psychology
Class and Lab Tuesday, Thursday 2:00-3:30 Buchanan D217

Course Outline Fall 2013

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Course Description: This course provides an introduction to some of the ways in which computers are used to create and study models and theories in psychology. This is **not** a course in computer programming. We will, however, devote some class and lab time to introductory programming in Matlab/Octave as we will require all students to develop their programming exercises in this language. (Student versions of Matlab can be purchased at the Bookstore – 2 installations per license; GNU Octave is a Matlab-like environment that is free at <http://www.gnu.org/software/octave/>). In the classroom the emphasis will be on conceptual understanding of computers and computing, theory- and model-building in psychology, and of three classes of psychological theory and model building: stochastic, nonlinear dynamic, and connectionist. Lab exercises are aimed at developing modelling skills in each of the three model classes. There will also be several labs devoted to Matlab programming. The conceptual and practical aspects will be united in a final modelling project.

Prerequisites and restrictions: This course is intended for students who wish to study how computers can be used to create and study models and theories of psychological processes. Some programming experience in Matlab is required or must be gained early in the course, as lab exercises require simple numerical programming skills.

Format of the course: Typically some weeks of lecture/discussion classes only will alternate with weeks during which there will be class on some days and lab on others. Lecture material and lab assignments will be available in pdf format on the Internet. Go to the Psychology webpage <http://www.psych.ubc.ca/> and click on "Online Course Material" and then click on my name beside the Psych 465A listing. Regular classes will be lecture/discussion and labs will be either guided exercises or individual work with help from me and from the TA and will refer to the pdf lecture notes. Suggested readings are available in the library. They are useful but not strictly required. Grading will be based on three lab assignments (results of simulations plus a short essay each) and one final project (results of simulations plus a longer essay).

Policies: Academic dishonesty (plagiarism or cheating, including collaboration or hiring outside programming consultants for assignments) will not be tolerated;

consequences include receiving zero marks on the affected assignment, reporting to the President's office, and possible expulsion from UBC (see Page 50 of UBC Calendar, section on "Student Discipline"). See Faculty of Arts booklet on plagiarism (available in Bookstore) for information on how to avoid it. The Department of Psychology subscribes to the "Turn-It-In" web-based plagiarism detector service. Unexcused late assignments will be marked according to a more stringent standard than on-time assignments, always involving loss of marks. Only doctor-validated medical excuses will be accepted for late assignments to avoid loss of marks. Students should retain a copy of all submitted assignments (in case of loss by me or the TA) – use a separate flashdrive for Psyc 465A assignments. Questions and comments are welcome and encouraged in both regular and lab classes.

Grading

Matlab projects (2)		pass/fail
SDT lab project		20 points
Chaos lab project		20 points
Connectionist lab project		20 points
Final Project		40 points
	Total =	100 points

Suggested readings (available at Koerner, Woodward or Main Library)

Apter (1970) *The Computer Simulation of Behavior*. Hutchinson.

Boden, M. (1988) *Computer Models of Mind*. Cambridge University Press.

Coren, Ward & Enns (2004) *Sensation and Perception* 6E. New York: Wiley.

Freeman, J.A. (1994) *Simulating Neural Networks with Mathematica*. Reading, MA: Addison-Wesley.

Green & Swets (1966) *Signal Detection Theory and Psychophysics*. Krieger.

Lehman (1977) *Computer Simulation and Modeling*. Erlbaum.

Parks, Levine & Long (1998) *Fundamentals of Neural Network Modeling: Neuropsychology and Cognitive Neuroscience*. Cambridge, MA: MIT Press.

Rumelhart & McClelland (1986) *Parallel Distributed Processing*. Cambridge, MA: MIT Press

Rosenbaum, David A. (2012) *MATLAB for Behavioural Scientists.* Routledge

Steinhauer (1986) *Artificial Behavior: Computer Simulation of Psychological Processes*. Prentice-Hall.

Uttal (1968) *Real-time Computers*. Harper & Row.

Walnum, C. (1999) *The Complete Idiot's Guide to Visual Basic 6.* Alpha Books.

Ward, L.M. (2002) *Dynamical Cognitive Science.* Cambridge, MA: MIT Press

Schedule of Classes, Labs and Readings

1. **Theories and models, computers, computer simulation, random processes, programming in MATLAB: Sept 5, 10, L(12), 17, L(19), 24, L(26)**
    - 1.1 Suggested reading
        - 1.11 Apter; Boden; Lehman; Steinhauer; Uttal; Rosenbaum Chaps 1-8
    - 1.2 Lab (dates indicated with **L(date))**
        - 1.21 MATLAB programming: guided exercises

2. Simulating Signal Detection Theory: Oct 1, 4, (L8), 10, (L15)
- 2.1 Suggested reading
    - 2.11 Coren Ward & Enns, pages 18-24; Green & Swets
- 2.2 Lab
    - 2.21 SDT project due 23 Oct

3. Simulating Chaos: Oct 18, (L22), 23, (L29)
- 3.1 Suggested reading:
    - 3.11 Ward
- 3.2 Lab
    - 3.21 Chaos project due 6 Nov

4. Simulating Neural Networks: Oct 31, Nov 5, 7 (L12), 14, (L19), L(21)
- 4.1 Suggested reading
    - 4.11 Freeman; Rumelhart; Parks
- 4.2 Lab
    - 4.21 Neural network project due 27 Nov

5. Final project: Nov 26, 28
- **5.1 Consultations on project during class times**
- **5.2 Due 10 December 2012 or before – email directly to Dr. Ward**