University of Alberta

PSYCO 452 "Minds and Machines"
Section: X50
Winter Term 2017

Instructor: **Professor Michael R.W. Dawson**
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Office Hours: See web page (URL given above) for hours, contact information, etc. for the instructor
Lecture Time & Room: **Tuesdays, 5-8 pm, BSB P-116**

Course Description: Computational models are playing an increasingly important role in cognitive psychology. The purpose of this course is to provide students with the theoretical background for using such models, as well as some hands-on experience. Students will learn about the history of these models in cognitive psychology, how one might characterize good and bad models, and how cognitive psychologists attempt to experimentally validate their models. [Faculty of Science]

Course Prerequisites: PSYCO 354

Course Objectives and Expected Learning Outcomes:
Computer simulation has played an important role in many different research areas in psychology. The purpose of this course is to provide students with a general understanding of the methods and goals of "synthetic psychology". This will be accomplished by striving towards two different goals. First, students will learn some of the fundamental concepts of how computer simulation methods can be incorporated into psychology. They will receive "hands on" experience with a variety of connectionist architectures, and by the end of the course they should feel comfortable in their knowledge of the advantages and disadvantages of this approach to modeling. Second, students will be able to relate their knowledge of connectionism to specific research issues in experimental psychology.

Readings (Supplied In Class):
Dawson, M.R.W. (2004). *Minds and Machines: Connectionism and psychological modeling*. Blackwell: Oxford, UK.
Dawson, M.R.W. (2005). *Connectionism: A Hands-On Approach*. Blackwell: Oxford, UK

Recommended or Optional Learning Resources:
Required readings and some supplementary readings will be provided on the course website for the lectures for which they are appropriate.

Lecture Schedule & Assigned Readings:

Day	Lecture	Homework In Class	Reading
Jan. 10	Week 1: Building Block 1 -- Connectionism and Association	Homework is from Dawson (2005)	Dawson (2004) Chap 1
Jan. 17	Week 2: Building Block 2 – Decisions (Nonlinearity)	Chapters 4, 5	Dawson (2004) Chap 9
Jan. 24	Week 3: Building Block 3 – Chains of Decisions	Chapters 6, 7, 8	Dawson (2004) Chap 10
Jan. 31	Week 4: Exploring Distributed Memory	Chapters 11, 12	Dawson (2004) Chap 11
Feb. 7	Week 5: Perceptrons and Animal Learning	Chapters 13, 14	Dawson (2004) Chap 2
Feb. 14	Week 6: Case Studies in Multilayer Perceptrons	Chapters 15, 16	Dawson (2004) Chap 3
Feb. 21	No Class, Reading Week		
Feb. 28	***Week 7: Review and Midterm Exam***		
Mar. 7	Week 8: Interpreting Local Representations	Chapters 19, 20	Dawson (2004) Chap 4
Mar. 14	Week 9: Interpreting Distributed Representations	Chapters 21, 22	Dawson (2004) Chap 5
Mar.21	Week 10: Exploring Distributed representations	Chapters 23, 24	Dawson (2004) Chap 6
Mar. 28	Week 11: Autoassociative networks	Chap 25	Dawson (2004) Chap 7
Apr. 4	Week 12: Deep Learning	Chap 26, 27	Dawson (2004) Chap 8
Apr. 11	***Week 13: Final Exam In Class***		

Representative Evaluative Material:
Past or representative material for evaluating performance in the course will be available from the course website.

Grade Evaluation:

Homework Assignments (In Class): 25%
Midterm Exam: 35%
Final Exam: 40%

Exams:
There will be a midterm exam and a final exam. Both exams will follow the same format: students will be asked to write 10 definitions, and will also be asked to write a long answer to an essay question. The exam format will be quite familiar to students who have taken PSYCO 354 from me. Both exams will be written in class. Students will be working on assignments throughout the term. More details on the mechanics of this are provided below.

Homework Assignments:
Much of our understanding of the connectionist architectures discussed in this course will come from hands-on experience with software exercises that will be delivered from one of the textbooks and supported by the course web page. Students will be working on these assignments throughout the term, as indicated in the Homework column of the lecture schedule provided above. We will be setting aside an activity time each class to permit students to complete and turn in homework assignments, and to consult about this work with the instructor.

How I Assign Your Letter Grade:

Letter Grade For Course	Final Mark (In Percent) To Obtain That Letter Grade
A+	89 – 100
A	85 – 88.9
A-	80 – 84.9
B+	77 – 79.9
B	71 – 76.9
B-	66 – 70.9
C+	61 – 65.9
C	57 – 60.9
C-	52 – 56.9
D+	50 – 51.9
D	48 – 49.9
F	0 – 47.9

Grades are unofficial until approved by the Department and/or Faculty offering the course.

Missed Term Exams and Assignments:

For an excused absence where the cause is religious belief, a student must contact the instructor(s) within two weeks of the start of Fall or Winter classes to request accommodation for the term (including the final exam, where relevant). Instructors may request adequate documentation to substantiate the student request.

A student who cannot complete a term assignment due to incapacitating illness, severe domestic affliction or other compelling reasons can apply for an extension of time to complete an assignment. This is to be done by consulting with the instructor. Deferral of term work is a privilege and not a right; there is no guarantee that a deferral will be granted. Misrepresentation of Facts to gain a deferral is a serious breach of the *Code of Student Behaviour*.

Student Responsibilities:

ACADEMIC INTEGRITY:
"The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at http://www.governance.ualberta.ca/en/CodesofConductandResidenceCommunityStandards/CodeofStudentBehaviour.aspx) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University."

All forms of dishonesty are unacceptable at the University. Any offence will be reported to the Senior Associate Dean of Science who will determine the disciplinary action to be taken. Cheating, plagiarism and misrepresentation of facts are serious offences. Anyone who engages in these practices will receive at minimum a grade of zero for the exam or paper in question and no opportunity will be given to replace the grade or redistribute the weights. As well, in the Faculty of Science the sanction for **cheating** on any examination will include **a disciplinary failing grade** (no exceptions) and senior students should expect a period of suspension or expulsion from the University of Alberta.

CELL PHONES AND RECORDING: Cell phones are to be turned off during lectures, labs and seminars. Cell phones are not to be brought to exams. Any recording, including written, audio or video, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or

used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

STUDENTS WITH DISABILITIES: Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students' Union Building).

ACADEMIC SUPPORT CENTRE: Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Student Success Centre (2-300 Students' Union Building).

Policy about course outlines can be found in section 23.4(2) of the University Calendar.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported in this syllabus.

Note: Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.