Minds, Brains, & Intelligent Behavior: An Introduction to Cognitive Science

Bronfman 106, Tuesdays and Thursdays, 9:55 to 11:10 AM
Williams College, Spring 2007

INSTRUCTOR CONTACT INFORMATION

Andrea Danyluk
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Office hours: open-door walk-in, as well as
Mondays 10 to 11am, Tuesdays 1 to 2pm, and Wednesdays 11am to 12pm

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Office hours: open-door walk-in
Eco-Café: Tuesdays 2:00 to 3:00pm

ABOUT THE COURSE

This course will emphasize interdisciplinary approaches to the study of intelligent systems, both natural and artificial. Cognitive science synthesizes research from cognitive psychology, computer science, linguistics, neuroscience, and contemporary philosophy. Special attention will be given to the philosophical foundations of cognitive science, symbolic and connectionist architectures, the neural basis of cognition, perception, learning and memory, language, action, problem solving, and artificial intelligence.

REQUIREMENTS

Lab Exercises: 50% of the final grade

Students will be assigned take-home lab exercises, approximately weekly, for a total of 10 assignments. Assignments will include complete instructions, and will usually be self-contained. In cases where lab exercises require a computer, the software for the course has been tested only on the Mac operating system. Mac labs can be found throughout campus, but you may reliably work in TCL 216 or in Bronfman 340.

Typically, lab work and write-ups will be due at the beginning of class one week after they are assigned. They will be graded on a 10 point scale, and will be penalized 1 point the first day late, 2 points the second day, and four points the third day.

Midterm and Final Exams: Each worth 25% of the final grade

Both exams will be 24 hour self-scheduled take-home exams. They will include quantitative portions and short essays. Both will be open book and open notes, but students may not discuss the exam material with each other.

The midterm will be available in the computer science administrative office (TCL 303) between 8:30 AM and 4:00 PM starting April 3. It will be due by 4:00 PM on April 10. The final exam will be available in the Registrar’s Office, and can be taken at any time during the final exam period.
**Readings**

There are two required books for this course, which are available at Water St. Books:


All additional readings will be on-line or posted on Blackboard in PDF format. They can be downloaded to any on-line computer, and printed on any of several campus printers.

**Class Attendance**

As adults, it is up to each student whether to attend classes, do the readings, and participate in class discussions. We will not take roll or keep track of how often people speak in class. We rely on grading to uncover lack of effort and reveal understanding of the course material. However, the success of a course of this type depends in part on the richness of the class discussions. Class discussions are a team effort, and if students fail to prepare and participate they let down their classmates. Students should accept the responsibility for helping to make the class better for everyone, including themselves.

**Disabilities**

Students with disabilities who may need disability-related classroom accommodations for this course are encouraged to set up an appointment to meet with either instructor as soon as possible and to contact the Dean’s Office at x4262 to insure that accommodations are provided in a timely manner.

**Honor Code**

All assignments in this course (the weekly labs, the midterm exam, and the final exam) are to be completed by each student independently. Students may seek help from the course teaching assistant on lab assignments. Students may *always* seek help from the instructors on any assignment.

*Plagiarism* includes copying text or making use of ideas from any source (such as another person, a book, an article, or a web site) without acknowledging that source. Thus, in the assignments students must acknowledge all sources *with citations*, and either endnotes or footnotes containing the full reference information for those citations.

Please see the statement on “Academic Honesty and Honor Code” in the *Student Handbook*. 
INTRODUCTION; HISTORY OF COGNITIVE SCIENCE, PART I

6 HISTORY OF COGNITIVE SCIENCE, PART II
   Mind, Ch. 1 (Representation and Computation) and Ch. 2 (Logic)
   Mind Readings, Ch. 1 (Simon, 1992)

8 REPRESENTATION

13 COMPUTATION

15 SYMBOLIC ARCHITECTURES: SYMBOLS AND RULES
   Mind, Ch. 3 (Rules)

20 SYMBOLIC ARCHITECTURES: PRODUCTION SYSTEMS
   Mind Readings, Ch. 3 (Anderson, 1993)

22 CONCEPTS
   Mind, Ch. 4 (Concepts)
   Mind Readings, Ch. 5 (Medin, 1989)

27 CONCEPT ACQUISITION, PART I
MAR 1 Concept acquisition, part II

6 Problem solving

8 Low-level vision, part I
Mind, Ch. 9 (Brains)

13 Low-level vision, part II

15 Mid-to-high-level vision

Spring Break

APR 3 Debate: Visual imagery
Mind, Ch. 6 (Images)
### APR 5  Connectionist architectures

*Mind, Ch. 7 (Connections)*

*Mind Readings, Ch. 8 (Rumelhart, 1989)*

### 10  Connectionist architectures: Learning


### 12  Debate: Symbols versus connections in language

*Mind Readings, Ch. 4 (Pinker, 1991)*


### 17  Computational grammar


### 19  Meaning and Latent Semantic Analysis


### 24  Intentionality

*Mind, Ch. 12 (Bodies, the World, and Dynamic Systems)*


### 26  Dynamic architectures

*Mind Readings, Ch. 13 (Eliasmith, 1996)*
May 1 Emergent properties

3 Emergent cognition and behavior
*Mind, Ch. 13 (Societies)*

8 Consciousness
*Mind, Ch. 11 (Consciousness)*
*Mind Readings, Ch. 10 (Flanagan,1992)*

10 The Future
*Mind, Ch. 8 (Review) and Ch. 14 (The Future)*