Class Times:
  Block K: Tuesday and Thursday, 2:30-3:50pm

Course Website:
  http://webct.brown.edu

Office Hours:
  Thursday 4-5pm, and by appointment
  Metcalf Research 219

Contact Information:
  The best way to reach me is by e-mail: tom.griffiths@brown.edu

Course objective:
  The objective of this course is to provide advanced students in cognitive science and computer science with the skills to develop computational models relevant to their interests. Computational modeling is one of the central methods in cognitive science research, and recent developments in artificial intelligence, machine learning, and statistics have provided a wealth of new tools for developing computational accounts of human cognition. Since people are better at solving many computational problems than current methods in computer science, studying human cognition can also lead to new methods of solving those problems.

Who should take this course:
  The course is designed for advanced students in cognitive science or computer science who are interested in developing computational models of cognition. Prerequisites are a basic familiarity with programming and mathematics, as might be obtained from CS 4 or AM 9, and interest in and awareness of some of the questions addressed by cognitive science, as might be obtained from any CG course.

Readings:
  There is no textbook for the class. Readings will consist of approximately two journal articles or book chapters per class (≈ 100 pages/week).

Course requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Percentage of final grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four problem sets (involving some programming)</td>
<td>40%</td>
</tr>
<tr>
<td>A final project or paper on cognitive modeling</td>
<td>50%</td>
</tr>
<tr>
<td>(1 page proposal, presentation, 10 page writeup)</td>
<td></td>
</tr>
<tr>
<td>Discussion notes</td>
<td>10%</td>
</tr>
</tbody>
</table>
Schedule of classes and readings:

PART I: FOUNDATIONS

September 6: Computational cognitive science

September 8: Computational problems


September 13: Levels of analysis

Problem Set 1 out


September 15: Representation I: Rules and symbols


September 20: Representation II: Spaces, trees, and features


September 22: Learning I: Innate domain-specific knowledge


September 27: Learning II: General-purpose learning mechanisms

Problem Set 1 due, Problem Set 2 out

September 29: Learning III: Bias and variance

October 4: Tools I: Probability theory and Bayesian inference

October 6: Tools II: Graphical models and structured probability distributions

PART II: APPLICATIONS

October 11: Similarity I: Spaces and features
*Problem Set 2 due, Problem Set 3 out*


October 13: Similarity II: Bayesian generalization

October 18: Semantic representation I: Networks and spaces


October 20: Semantic representation II: Topics


October 25: Categorization I: Prototypes and exemplars
*Problem Set 3 due*


October 27: Categorization II: Statistical models


November 1: Unsupervised learning I: Discovering latent structure

*Project Proposal due, Problem Set 4 out*


November 3: Unsupervised learning II: Model selection


November 8: Unsupervised learning III: Infinite models


November 10: Game theory (guest lecture)

November 15: Causality I: Causal graphical models

*Problem Set 4 due*


November 17: Causality II: Theories


November 22: Evolution I: Evolutionary models


November 29: Evolution II: Cultural transmission


December 1: *Final Project presentations (double session)*

December 16: *Final Project due*