Instructors:  John R. Anderson (ja@cmu.edu), Dan Bothell (db30@andrew.cmu.edu)

Books, etc:
Anderson:  How can the human mind occur in the physical universe?
Graham: ANSI Common LISP
There is also an ACT-R Tutorial that can be downloaded.

The goal of this course is to teach cognitive modeling techniques.  These techniques have a number of applications including
1. Understanding human cognition
2. Design of systems that will interact with humans
3. Development of intelligent tutoring systems
4. Design of cognitively plausible agents to occupy synthetic or real environments
5. Organization of data on brain function

The course will have a focus on these topics as they apply to learning, particularly in educational settings but we will consider a wider range of applications.  Students may choose to perform any final project that involves cognitive modeling.

The first two-thirds of the course will involve reading about the ACT-R cognitive architecture, other papers of cognitive architectures, and will involve a series of 6 small projects involving ACT-R.  There will be a 24 hour take home exam on this material.  The last third of the class will be focused on a project of your choosing.

After finishing this part of the course you should be able to:
• Describe the key issues involved in the design of cognitive architectures
• Utilize the cognitive architecture, ACT-R, to model a variety of human cognitive processes
• Understand more generally how computational modeling techniques can be brought to bear on learning tasks.
• Understand issues in learning to become proficient at mathematical problem solving

You will do a project of your choice that will involve practice in
• Delivering an effective oral presentation
• Writing an effective project report
• Constructively critiquing peers' projects

Tentative Schedule

January
Tues, Jan 17:  Class Organization & Introduction
Thurs, Jan 19: Introduction to ACT-R

**Unit1 (5 points): Understanding Production Systems (due 11 PM, Mon, Jan 23)**

Tues, Jan 24: ACT-R: The Perceptual Motor Interface
Thurs, Jan 26: Discuss Chapter 1&2 from Anderson 2007
Tues, Jan 31: Discuss Chapter 3 from Anderson 2007

**Unit2&3 (10 points): Subitizing (due 11 PM, Wed, Feb 1)**

February
Tues, Feb 2: ACT-R: Base-Level Learning
Thurs, Feb 7: Paper on Cognitive Architectures
Thurs, Feb 9: Discuss Chapter 4 from Anderson 2007

**Unit4 (10 points): Zbrodoff model (due 11 PM, Mon, Feb 13)**

Tues Feb 14: Utility Learning & mini-project description
Thurs, Feb 16: Discuss Chapter 5&6 from Anderson 2007

**Mini Project Part 1 (X points) (due 11 PM, Mon, Feb 20)**

Tues, Feb 21: TBA
Thurs Feb 23: TBA

**Mini Project Part 2 (Y points) (due 11 PM, Mon, Feb 27)**

Tues, Feb 28: ACT-R: Spreading Activation and Partial Matching

March
Thurs Mar 2: TBA
Tues Mar 4: TBA

**Unit5 (10 points): One-hit blackjack (due 11 PM, Wed, Mar 8)**

Thurs Mar 9: TBA
Tues & Thur Mar 14&16: Spring Break
Tues, Mar 21 ACT-R: Production Compilation
Thurs, Mar 13: TBA
Tues, Mar 28: TBA

**Unit6&7 (10 points): Past Tense Model (due 11 PM, Wed, Mar 29)**

Thurs, Mar 30 TBA

April
Tues, Apr 4: TBA
Thurs, Apr 6: TBA
Tues, Apr 11: TBA
Tues, Apr 13: TBA

**April 14-19: 24 hour take-home exam (25 points)**

Thurs, Apr 20: Spring Carnival
Tues Apr 24 – May 4: Final Project Reports

**Grading**

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tr>
<td>Units</td>
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<tr>
<td>Mini-Project</td>
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<td>A: &gt;120 for undergraduates</td>
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<td>Final Project</td>
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