This course is an introduction to the field of Cognitive Science. To capture the interdisciplinary nature of the field, we will address a range of topics and research from a variety of disciplines, including psychology, neuroscience, philosophy, linguistics, computer science, and artificial intelligence. You will learn about the foundations of Cognitive Science, its history, how the field is currently evolving. We will explore some of the lively debates that have taken place within and across the constituent disciplines, and how scientific research is key to our understanding of how our minds work.

**Learning Goals:**

- Appreciate the interdisciplinary nature of cognitive science, the diversity of viewpoints, the controversies and the areas of consensus.
- Be proficient in the language of cognitive science and information processing.
- Be able to read and discuss published research papers.
- Learn different conceptions of computation and representation
- Learn about essential cognitive processes (e.g., Neurobiology & Perception; Attention & Memory
- Language acquisition & the language of thought, Reasoning, Decision-making & Cognitive Shortcuts)
- Learn how research findings inform our understanding of human cognition, & how this knowledge can be applied to real-world problems.

**Readings** (tentative!)

I will provide a set of readings consisting of book and textbook chapters, and articles (many peer-reviewed),. You will have access to them through GoogleDrive, Sakai & links in this syllabus.
Syllabus as a dynamic guide to topics & readings

Please note the syllabus, readings & topics are tentative & may change just prior to covering material in class. So it is important to check the syllabus every week & attend class where we will discuss changes in reading material or topics covered.

Assessment

Reaction Papers (30%): Five reaction papers, of which three will count towards your grade.

- Since our class is large, we may do a sampling approach to determine which 3 papers are graded. I will explain this approach which also happens to be a key method used in statistical analysis of research data.
- Format: APA (or another common format you’re comfortable with), 2 pages, double-spaced. As to the content, reaction papers are just literally your reactions to the content taking the following questions into consideration when you are writing your reaction papers:
  1. Briefly describe a key point or two that the author presents in this text?
  2. What are your opinions on them?
  3. How did this article speak to you?
  4. How does the content of this text relate to the material we discussed in the class?
  5. What are some things that the author didn't take into consideration?
  6. Are there any hidden assumptions that might not necessarily hold?

- Limit summarization of what the author argues to one paragraph containing less than 5 sentences.
- Explore your novel ideas and criticisms.
- Please name your reaction paper word documents as “NameLastname_RP#” with # = 1 to 5 so it's easier for us to sort & identify them.

Two Exams (50%)-- multiple-choice plus 1 or 2 short essays; Exams are quasi-cumulative in the sense that material covered later in course builds upon earlier material, so while exams will focus on topics either in 1st or 2nd half of course-- the 2nd half material builds upon material presented in earlier parts of course.

Attendance (20%): In-class activities, including possible brief quizzes which can be multiple-choice or short-answer.

Schedule of topics (tentative!)

[Link to Rutgers fall 2018 calendar]

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading or Subtopic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Our minds: Understanding ours &amp; other minds</td>
<td>Human vs. Animal vs. Robotic</td>
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<tr>
<td>9/5/18</td>
<td>○ Cognitive Science?</td>
<td>Recent Advances in AI Robotics: Machine learning &amp; Neural Networks (NYT 7/30/18)</td>
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<tr>
<td>1</td>
<td>Historical Landmarks</td>
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| 9/5 & 9/6 | ○ Shift away from Behaviorism  
○ Algorithmic computation  
○ Formal analysis of mental processing  
○ Cognitive Revolution  
○ Steven Pinker (2011) |

**Bermúdez, J. L. (2014)**  
Part 1: Chap 1 & Chap 2 (p39-p55)  
Classics:  
**Tolman (1948)**  
**Chomsky (1957)**

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<thead>
<tr>
<th>1&amp;2</th>
<th>Cog Sci-- fragmented field or unified science?</th>
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| 9/5 to 9/13 | ○ Multiple-disciplines:  
○ Info processing as unifying construct?  
○ Digital computer as key inspiration  
○ Representation & Transformational Rules |

**Fridenberg & Silverman (2011) Chap 1**  
**Bermúdez**  
Prt 2: Chap 4 (4.2-4.3 pp 87-97)  
○ Interdisciplinary  
○ Levels of explanation &  
○ Integration Challenge  
Prt 3: Chap 6 Info processing Models of Mind (pp TBA)  
F&S Chap 1 & 2 Outline & notes

<table>
<thead>
<tr>
<th>2</th>
<th>Philosophy of Mind</th>
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| 9/12 & 9/13 | ○ Representation & Symbolism  
○ Reference to real world objects  
○ Classical cognitive science  
○ Connectionism  
○ Embodied cognitive science.  
○ Levels of analysis (Marr, 1982)  
○ Computational, Algorithmic, & implementational levels. |

**F&S (Chap 2)**  
**Pylyshyn (1999)**  
**Dawson (2013).** chap 1  
Marr’s Levels  
F&S (p10+)  
**Bermúdez** (p46-56)

<table>
<thead>
<tr>
<th>3</th>
<th>Artificial vs. Human Intelligence</th>
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</table>
| 9/19 & 9/20 | ○ Thinking & understanding vs.  
○ Artificial vs. Human Intelligence  
○ Can computers think?  
○ AI & Deep Learning  
○ Prediction vs. Explanation  
○ Strong vs. Weak AI (Turing Test & Chinese Room) Stanford |
<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&amp;5</td>
<td><strong>Cognitive Neuroscience &amp; Brain Function</strong>&lt;br&gt;● Localized vs. distributed representation&lt;br&gt;● <em>Human-Computer Interfaces (HCI)</em>&lt;br&gt;  ○ <em>Thought controlled HCI (via brain activity)</em></td>
<td><em>Bermúdez</em>&lt;br&gt;Part 2: Chap 3&lt;br&gt;<em>Clinical Neuroscience (Sacks, 1985)</em></td>
</tr>
<tr>
<td>5&amp;6</td>
<td><strong>Perceptual &amp; Motor Skills</strong></td>
<td>TBA</td>
</tr>
<tr>
<td>7&amp;8</td>
<td><strong>Attention</strong>&lt;br&gt;○ Automatic vs. Controlled behaviors.&lt;br&gt;○ Search, Track &amp; Select information&lt;br&gt;○ Priming &amp; Expectations&lt;br&gt;○ Cognitive Load and Divided Attention&lt;br&gt;  ■ <em>Distracted driving, cell phones &amp; texting</em>&lt;br&gt;  ○ Eye-movements &amp; Eye-tracking Research</td>
<td>TBA</td>
</tr>
<tr>
<td>9</td>
<td><strong>Consciousness</strong>&lt;br&gt;● Wrap up &amp; Review - Lecture&lt;br&gt;● Exam 1 -- Thurs Recitation</td>
<td>TBA</td>
</tr>
<tr>
<td>10</td>
<td><strong>Memory</strong>&lt;br&gt;○ Encoding, Retrieval &amp; Memory Errors&lt;br&gt;○ Constructive nature of memory&lt;br&gt;○ Improving memory (e.g., chunking, imagery)&lt;br&gt;○ False memories &amp; Eyewitness testimony</td>
<td><em>Memory Decay</em> Model</td>
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<tr>
<td>Date</td>
<td>Topics</td>
<td>Notes</td>
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<td>------------</td>
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| 11/14 & 11/15 | Problem Solving & Reasoning  
|            | Framing & Anchoring                                     | TBA                 |
|            | Deductive vs. Inductive Reasoning                        |                     |
| 11/21-Wed  | Language & thinking                                      | TBA                 |
| 11/22-Thanksgiving | Decision Making  
|            | Heuristics: Cognitive Shortcuts & Disregarding baseline information. |                     |
|            | Judgments & Justification: Making Decisions with incomplete information |                     |
|            | Persuasion, Framing & Confirmation Bias                  |                     |
| 12/5 & 12/6 | Research Methods                                         | Supervised: Bayesian Stats & Bayes Theorem: Conditional Probability & Odds Ratio |
|            | Methods commonly used today  
|            | Inductive approach                                       | Building Machines that Learn & Think Like People - Tenenbaum (2018) |
|            | Cognition as probabilistic inference  
|            | Probabilistic models & representation                   |                     |
|            | Supervised & Unsupervised Learning                       |                     |
|            | Probabilistic learning & induction                       |                     |
| 12/12      | Wrap up + final entertaining topic TBA                   | Classes End 12/12   |
|            |                                                          | Reading Day 12/13   |
|            |                                                          | Final Exams 12/14-12/21 |
| 12/17      | Final Exam Date - 12/17                                  |                     |
|            |                                                          |                     |
|            | **COGNITIVE SCIENCE (01:185:201)**                       |                     |
|            | Index Section Exam Code Exam Day and Time               |                     |
| 04687 01 C | Dec 21, 2018: 8:00 AM - 11:00 AM                        |                     |
| 22329 02 C | Dec 17, 2018: 8:00 AM - 11:00 AM                        |                     |
| 22330 03 C | Dec 17, 2018: 8:00 AM - 11:00 AM                        |                     |
Readings:

Introduction & Overviews of Cognitive Science


Specific topics & Research in Cognitive Science (tentative!)


Some general tips

- Try to get enough sleep before class.
- Read the material, if any, before coming to class.
- Please turn off your phones in class.
- Participate, you will find it that everything will be more engaging.
- If you are going to use a laptop anyway, please seat yourself towards the back seats so at least it doesn’t distract others.

Note: Your decision to remain enrolled in the course after the class’s second meeting is your implicit agreement to this syllabus.
Get Involved with Cog Sci Club!
Find information on the exciting events being organized by the Cognitive Science Club:
http://ruccs.rutgers.edu/academics/undergraduate/cogsci-club

Academic dishonesty
You are required to abide by the Rutgers policy on academic integrity; please familiarize yourself with this policy, you can view it here. As you can imagine, consequences are quite severe. Please don’t plagiarize.

PLAGIARISM

1. If you copy something that is in print ANYWHERE (books, journals, popular magazines, on-line blogs, mailing lists etc.), you are plagiarizing.
2. Taking someone else’s words and substituting a word here or there is still plagiarism.
3. Paraphrasing someone else’s words but ‘borrowing’ their line of argument and reasoning is plagiarism.
4. Even if you are in a pinch and facing a looming deadline, don’t plagiarize. It’s stealing. Better to hand in something that is yours than to hand in something that you stole.
5. For more guidelines,
   · 20 minute interactive-tutorial on Plagiarism and Academic Integrity:
     http://www.scc.rutgers.edu/douglass/sal/plagiarism/intro.html
   · Camden Plagiarism Tutorial: http://library.camden.rutgers.edu/EducationalModule/Plagiarism/
   · Don't Plagiarize: Document Your Research! : http://www.libraries.rutgers.edu/avoid_plagiarism

Rutgers Current Academic Integrity Policy:
http://academicintegrity.rutgers.edu/academic-integrity-policy/

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.

Student-Wellness Services:

Just In Case Web App
http://codu.co/cee05e
Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)
(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ www.rhscaps.rutgers.edu/
CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students’ efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)
(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/
The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services
(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / https://ods.rutgers.edu/
Rutgers University welcomes students with disabilities into all of the University’s educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and
provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus’s disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

**Scarlet Listeners**
(732) 247-5555 / http://www.scarletlisteners.com/
Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.