Meetings: Instructor: Dr. Hoi-Chung Leung
Tu & Th: 9:50 – 11:10 Office: Psych B, Room 314
Psych A, Room 256
Office Hours: Tuesday 4 – 6 p.m.

Course Description
This seminar course is a survey of current research findings, theories, and empirical approaches towards the understanding of the neural basis of cognition. The aim of this course is to discuss how one might investigate the neural basis of higher-order cognitive functions (with a focus on the role of prefrontal cortex in memory and executive functions) and to evaluate the strengths and weaknesses of cognitive neuroscience approaches.

Class Format
The class will be in the format of short presentation, interactive discussion and open debate between seminar participants. To facilitate dialogue, each member is expected to briefly present points raised in their reaction papers (see below) as a starting point for discussion.

Class Requirements
1. Weekly Readings
There is no textbook requirement. Weekly readings are listed below. Please check blackboard for weekly updates (http://blackboard.stonybrook.edu/). Those not available online can be copied from the instructor.

2. Weekly reaction papers (Due in my office no later than 5pm on the day prior to each class.)
Class members are expected to write a short reaction paper (as if you are a reviewer) on each reading. The reaction papers should be concise, not to exceed one page long per reading. You are recommended to first write a brief summary (not to exceed 150 words to state the purpose, hypotheses, approach and major findings of the study) and then summarize your reactions to the followings:
i. General comments you have about the readings (e.g., what is the significance and potential impact);
ii. Why you agree or disagree with the theoretical arguments, approach and/or the empirical findings;
iii. Suggestions you have for further analysis, experiments and/or theoretical clarifications.
iv. Find at least one additional article to support your view and integrate it into your arguments. Recent papers are preferred, but it is more important to find a paper that offers strong evidence and/or theoretical significance. (Remember to properly cite your source of information.)

3. Weekly presentation and discussion (see Course Resources on blackboard for suggestions)
Each week, class members are expected to give presentations and lead discussions on assigned readings. A group of 2 students will be designated to present the assigned paper and leading the discussion (e.g., offering views to support the theory propose by the paper).
Students not presenting should prepare for counter arguments or alternative views, using the assigned paper and paper(s) you may have found, in these discussions. Our general aim is (1) to critique the assigned paper and (2) to develop an alternative experimental design to address the concerns and/or follow-up experiments to further address the question.

4. Term paper
The term paper (in proposal format) is to explore a topic in additional depth, by either following up on an issue raised in class or pursuing a topic of interest not covered in the course but within the field of cognitive neuroscience. The length of the proposal should be between 8-10 pages (double spaced and font size 11 pt). Abstract and references are not counted towards the page limit. The proposal must include the following sections: Abstract, Introduction, Methods, Predicted results, Alternative hypothesis, Discussion and References. The format of all reference sections of the paper is APA.

Term paper Schedule:
First draft: Submit a title, an abstract to outline your topic, and a list of at least 10 references on or before October 30th, 5 p.m. Make an appointment to meet with the instructor during week 8.
Final paper: Submit the final paper (1 paper version and 1 electronic version) on or before Dec 4th, 5 p.m. All papers will be published on blackboard for the class.

Final presentation: Each student will give a final presentation on his/her paper.

Final paper reviews: Everyone will be given 3 papers to review and score each one according to a specific guideline. The scoring decision should be primarily based on the quality of the paper (i.e., significance, approach, and innovation). Your review will remain anonymous. The final reviews will be due on the last day of class (Dec 18th, 5 p.m.).

All students should keep in mind that the principle of Academic Honesty requires that this paper be the original work of the student who submits it, and must include appropriate citations for statements and ideas that are the original work of others. If in doubt, cite your sources.

University Policies:
Americans with Disabilities Act: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: http://www.sunysb.edu/ehs/fire/disabilities.shtml.

Academic Integrity: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Grading:
- Participation and presentation 40%
- Reaction papers 40% (2 points/reaction paper, drop 2 lowest scores)
- Term paper 20%

Class Schedule:

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<th>Topic</th>
<th>Readings</th>
<th>Reaction papers</th>
<th>Notes</th>
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<td>Ia</td>
<td>09/01/09</td>
<td>Introduction &amp; Organization &amp; History of the field</td>
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<tr>
<td>Ib</td>
<td>09/03/09</td>
<td>Lecture: Anatomy and Methods</td>
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<tr>
<td>Ic</td>
<td>09/08/09</td>
<td>Lecture: Imaging the mind - fMRI</td>
<td>4, 5, 6 (v)</td>
<td>RC1 (summary)</td>
<td>1st reaction paper</td>
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<td>Id</td>
<td>09/10/09</td>
<td>Lecture: Prefrontal System &amp; Cognition</td>
<td>7 (vi)</td>
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<tr>
<td>II</td>
<td>09/15/09</td>
<td>Effects of frontal lobe damage</td>
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<td>RC3 (critique from here on)</td>
<td>1st group presents the paper</td>
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<td>III</td>
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<td>IV</td>
<td>10/01/09</td>
<td>Functional organization of the prefrontal system</td>
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<td>RC7</td>
<td>9/29 follow Monday</td>
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Reading List:

**Ia. Introduction:** What is cognitive neuroscience?


2. Milner, B., Squire, L. R., & Kandel, E. R. (1998). Cognitive neuroscience and the study of memory. Neuron, 20(3), 445-68. (Note: Try not to become bogged down by details of this review; instead, read with the goal of getting a sense of how neuroscience has transformed our understanding of cognition such as memory.)

**Ib. Anatomy and Methods:** What is the role of technology in studying cognitive neuroscience? What are the advantages and limitations of different techniques for studying brain function?


**Background readings:**

(i) Gazzaniga, Ivry, & Mangun (2009) Cognitive Neuroscience, 3rd edition, Chapter 3, Neuroanatomy and development. [Copy if needed. If you don't know where basal ganglia is, you should take a quick look.]

Recommended readings: Read the following articles if you already have some background in brain imaging methods.


** also check Supplementary Materials and Blackboard for additional readings and resources

Ic. Imaging the mind – What fMRI can and cannot tell?


Background readings:


Id. Prefrontal System and Cognition – An overview of brain regions involved in cognition


Background readings:


II. Effects of frontal lobe damage - Is the prefrontal cortex necessary for maintenance of information and executive control?


Background reading:


III. Prefrontal system and aging - How does the relationship between brain function and cognition change across life span?


Background readings:


Casey, B. J., Galvan, A., & Hare, T.A. Changes in cerebral functional organization during cognitive development. Current Opinion in Neurobiology., 12, 239-244.

Recommended readings:


IV. Functional Organization of the prefrontal system


Background readings:


Recommended readings:

V. Cellular basis of cognition – neurophysiology: What kind of information is being represented by the neurons?


Background readings:

Recommended readings:


VI. Neuropharmacological basis of cognition - dopamine: What is the role of dopamine in prefrontal function and working memory?


Background readings:

Recommended readings:


VII. Working memory and executive control: How executive control works?


Background readings:

VIII. Long Term memory: What kind of memory is represented by hippocampal activity?


Recommended readings:

**VIII. Attention and object selection: Top-down?**


**Recommended readings:**


**IX. Language – How does the human brain represent language?**


**Background readings:**


**X. Decoding the mind?**


**Recommended readings:**