Psychology 620 Section 27 “Cognitive Neuroscience Seminar”
Topic: Prefrontal cortex and Cognition
Spring Semester, 2007

Meetings: Th 2:20 – 3:40
Psych B, Room 256

Instructor: Dr. Hoi-Chung Leung
Office: Psych B, Room 314
Office Hours: By appointment.

Course Description
This seminar course is a survey of current research findings, theories, and empirical approaches towards the understanding of the role of prefrontal cortex network in 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 memory and executive functions) and to evaluate the strengths and weaknesses of the 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. Articles discussed in each class will be available on “blackboard” for download (http://blackboard.stonybrook.edu/). Those not available online can be copied from the instructor. Copies will also be made available in the Graduate mailroom.

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 exceeding 100 words) 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
Each week, class members are expected to give presentations and lead discussions on assigned readings. (Presentations can be in overhead or powerpoint format.) One group of 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). Another group of students should prepare for counter arguments or alternative views. Use the assigned paper and the paper(s) you may have found in these discussions. The aim is (1) to critique the paper presented and (2) to develop an alternate design for an experiment 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 10 -15 pages (double spaced and font size 12 pt; page number does not include references). 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 and abstract of your topic with a list of at least 10 references. Make an appointment to meet with the instructor during week 8 (on or before March 16, 5pm).
**Final paper:** Submit the final paper (1 paper version and 1 electronic version) to the instructor during week 13 (on or before April 19, 5pm). All papers will be published on blackboard for the class.

**Final presentation:** Each student will give a final presentation (15 min) on his/her paper.

**Review process:** 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.

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.

*If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Disabled Student Services office (DSS), Room 133 Humanities, 632-6748/TDD. DSS will review your concerns and determined, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.*

---

**Class Schedule**

*Week/Date*  
**Discussion Topic**

**Week 1**  
1/23 Course objectives, format, requirements, and additional resources (reference books/articles; web sites)

1/25 Lecture: The Prefrontal Cortex and Cognitive Neuroscience

**Recommended reading:**

- 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; instead, read at a global level with the goal of getting a sense of how neuroscience has transformed our understanding of cognition such as memory.)

**Week 2**  
**Methods in Cognitive Neuroscience**

**Question:** How have brain-mapping techniques been used in studying cognitive neuroscience? What are their advantages and limitations?


**Recommended reading:**


**Prefrontal Cortex Theories**

**Week 3**  
**Functional organization of the prefrontal network**

**Question:** How is the prefrontal cortex functionally organized – domain-specific vs. process-specific models?


Background readings:

**Neuropsychology of Prefrontal Cortex**

**Week 4**

**Patients with frontal lobe damage**

*Question: Is the prefrontal cortex necessary for maintenance of information and executive control?*


*Recommended reading:*

**Week 5**

**Development and Aging**

*Question: How does the relationship between brain function and cognitive function change across life span?*


*Recommended readings:*


**Animal Research of Prefrontal Network**

**Week 6**

**Cellular basis of cognition – monkey electrophysiology**

*Question: What is being represented by the activity of prefrontal neurons?*


*Recommended Readings:*


**Week 7**

**Neuropharmacology**

*Question: How dopamine influences prefrontal function and cognitive behavior?*


**Recommended Readings:**


**Human Research of Prefrontal Network**

**Week 8**

**Working Memory**

*paper outline due at 5pm, March 16 (title, abstract, and at least 10 relevant references)*

*Question: What is being represented by the fMRI signals during working memory tasks?*


**Recommended Readings:**


**Week 9**

**Attention**

*Question: Does covert attention and saccade preparation share the same neural process?*

3/20  TBA

3/22  TBA

**Week 10**

**Episodic Memory: Encoding and Retrieval**

*Question: Are there separate memory processes: phonological vs. semantic & recollection vs. familiarity?*

3/27  TBA

3/29  TBA

**Week 11**

4/2 – 4/7  *Spring Break*

**Week 12**

**Social/Emotional Cognition**

*Question: How social and/or emotional factors influence brain function and cognitive behavior?*

4/10  TBA
Week 13  
Thought and Mind Reading

Question: What does neuroimaging tell us about thought and mind?

4/12  TBA

4/17  TBA

4/19  TBA

* final paper due at 5pm, April 20

Week 14  
Modern Prefrontal Theory


4/26  Term Paper Presentation

Week 15

5/1, 5/3  Term Paper Presentation

* final reviews due at 5pm, May 4