Course content: This course is concerned with the study of mind and brain, what is called “cognitive neuroscience”. Cognitive neuroscience is an inter-disciplinary area that represents an attempt by cognitive psychologists and neuroscientists to discover how mental processes are implemented in the brain. The approach focuses on human cognitive and emotional processes and relies heavily on the methods and findings of neuroscience. This is the kind of research that is currently receiving intense coverage in the media, and this course should provide you with a deeper understanding of what you might read and hear about outside of the classroom.

The topics covered are the major ones in higher-level cognition, and include: conceptual representations, long-term memory, working memory, attention, control processes, emotion learning, decision making, reasoning, and language processing. To understand the cognitive-neuroscience approach to these topics, students will be introduced to some elementary neuroanatomy, to the logic of studies with neurological patients, and to functional neuroimaging techniques, particularly Positron Emission Tomography (PET), and functional Magnetic Resonance Imaging (fMRI). The goal is to use these techniques,
along with behavioral measures, to understand the topics of interest at both a cognitive (or psychological) and neural level.

**Classes:** Classes meet Monday and Wednesday, 10:35 – 11:50am, and consist of lectures and a couple of review sessions. Between 2-4 classes will be devoted to the discussion of a topic (e.g., working memory). The intent is to provide a substantially deeper treatment of each topic than would be available in an introductory-level course.

**Readings:** The readings include (1) chapters from recently published textbook, (2) required articles and (3) suggested articles. The textbook is authored by Smith and Kosslyn (hereafter, S&K), and is entitled, “Cognitive Psychology: Mind and Brain” (the observant may notice a resemblance to the course’s title—no accident). The book has just been published by Prentice Hall and is available in the Columbia University Bookstore (in Lerner Hall).

The required articles are typically literature reviews, but sometimes critical research papers. The level of these papers is often higher than that of the book chapters. The suggested articles are usually even more advanced, and intended for students who are particularly interested in the topic.

Exams/Grading: Grades will depend on three factors: (1) an in-class midterm, scheduled for TBD, which covers all the material up to that point and is worth 30%; (2) a final, scheduled for TBD which covers material from the entire semester but emphasizes the material presented in the second part of the semester; and (3) a short (6-8pp.) paper on a course topic that you find of particular interest. This paper will be due near the end of the course.

SYLLABUS

Below are listed the intended topic of each lecture, along with the readings for that lecture. Please do the readings before the lecture so that you can understand what is being said in class. (Obviously, Week 1 is an exception.)

NO CLASS ON march 23RD

Week 1
1/21: Lecture 1 Introduction to course

Week 2
1/26: Lecture 1 Historical overview and basics about cognitive neuroscience

Required: S&K: Chapter 1


1/28: Lecture 2 Perceptual representations: How do we recognize objects?
Required: S&K: Chapter 2 (Section 4: “Achieving Visual Recognition”)

S&K: Chapter 4

Suggested: TBD

Week 3
2/02 Lecture 1  Perceptual representations: Are there specialized regions for recognizing faces and places?


2/04: Lecture 2  Conceptual representations: Perceptual vs. functional features


Week 4
2/09: Lecture 1  Conceptual representations: More connections to perceptual and motor systems


2/11: Lecture 2  
*Long-term memory (LTM): Different kinds of memory systems*

Required: S&K: Chapter 5


Suggested: TBD

Week 5

2/16: Lecture 1  
*Explicit LTM: Input and storage*


Suggested: TBD

2/18: Lecture 2  
*Explicit LTM: Retrieval*


Suggested: TBD

**Week 6**

2/23: Lecture 1 Explicit LTM: Role of emotion

**Required:** S&K: Chapter 8


2/25: Lecture 2 Implicit LTM: Priming and perceptual categories


**Suggested:** TBD

**Week 7**

3/02: Lecture 1 Review session – no readings (Teal)

3/04: Lecture 2 MIDTERM

**Week 8**

3/09: Lecture 1 Implicit LTM: How it affects social behavior


Suggested: TBD

3/11: Lecture 2  
WM: Modality specificity in storage


Suggested: TBD

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**Week 9**

**NO CLASS – SPRING BREAK**

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**Week 10**

3/23: NO CLASS

3/25: Lecture 1  
WM: Maintaining vs. manipulating information

Required: S&K: Chapter 6


Suggested: TBD

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**Week 11**

3/30: Lecture 1  
WM: Breakdowns in normal aging and pathology


4/01: Lecture 2  Executive processes: Attention

**Required:**  S&K: Chapter 7


**Suggested:**  S&K: Chapter 3


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**Week 12**

4/06: Lecture 1  Executive processes: Inhibition and suppression


**Suggested:**  TBD

4/08: Lecture 2  Executive Processes: Controlling emotion


**Week 13**

4/13: Lecture 1  
**Decision making: Rationality?**

**Required:**  
S&K: Chapter 9


Suggested: TBD

4/15: Lecture 2  
**Decision making: Role of emotion**

**Required:**  


Suggested:

**Week 14**

4/20: Lecture 1  
**Reasoning and problem solving: Heuristics in reasoning**

**Required:**  
S&K: Chapter 10


TBD

Suggested: TBD

4/22: Lecture 2  
**Reasoning and problem solving: General heuristics and effects of expertise**


**Suggested:**  TBD

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### Week 15

**4/27: Lecture 1  Language processing: Overview and syntactic process**

**Required:**  S&K: Chapter 12


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**4/29: Lecture 2  Language processing: Breakdowns**


**Suggested:**  TBD

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### Week 15

**5/04: Lecture 1  Visit to fMRI center at Neurological Institute**