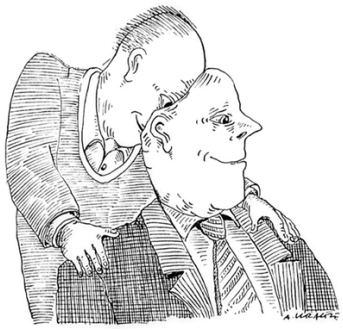
PSY 767
Seminar in Cognitive and Behavioral Neuroscience



Spring 2018

Tu, Thu 9:30 – 10:45am, LSS-281

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Course Overview:
Cognitive neuroscience is a rapidly expanding field that relies on relatively recent technological advances to investigate the neural basis of cognitive functions. These methods also shape the way we think about the brain, what we mean by "brain activity", and how we interpret behavior. The overall objective of this course is to explore the basic concepts underlying major neuroimaging modalities and their application from a "what, why, and how" perspective.
Following a brief review of neuroanatomy and the visual system, we will survey the various methods and their respective principles of signal generation, and will look at the pros and cons based on a unifying question of how we process and recognize faces. This will include lesion studies, scalp and intracranial electroencephalography (EEG), magnetoencephalography (MEG), and magnetic resonance imaging (MRI) with an emphasis on functional MRI. Visits to an EEG laboratory and the MRI Center will provide insights into some practical issues related to data acquisition and analysis. Subsequently, we will consider the unique neuroimaging contributions to cognitive domains such as language, executive functions, neuropsychopharmacology, and will introduce issues relevant to genomic imaging. Throughout the course students will be encouraged to evaluate research conducted with different neuroscience methods with respect to their relative strengths and weaknesses in the pursuit of scientific questions. This course includes lectures with extensive slide presentations (made available to students), class discussion, brief student in-class presentations, field trips, mini quizzes, and written assignments. All announcements will be posted regularly on Blackboard.

Learning Outcomes:
By the end of the class the students will be able to:
- describe the biophysical and neural basis of the signal acquired by different neuroimaging methods
- implement that conceptual understanding by selecting the imaging methods, research design, and statistical approaches that are best suited to the scientific question of interest
- describe how the current methods have advanced our knowledge of the neural basis of

cognitive functions including visual object/face processing, language, and decision making.
- evaluate and discuss scientific papers with respect to their theoretical importance and the soundness of their methods
- write a research proposal to test brain-based hypotheses using optimal methodology
- incorporate neuroimaging methods in their research plans and consider innovative approaches with an eye toward fostering independent career paths

Office hours:
I will be available after class on both days. We can also arrange for additional time to meet in my office or to speak on the phone. The best way to contact me is via e-mail with any questions you may have.

Assessment and grading:
Most of the material presented in class is not available in any one textbook so regular attendance is essential. Active participation in discussions is expected. Please talk to me about planned or expected absences.

Quizzes:
Starting in week 3, a short quiz will be given covering the material from the previous week on Tuesdays in the beginning of class. Each quiz is worth 5 points and ten best scores will be tallied for a total of 50 points (20% of the grade).

Brief presentations:
Each student will prepare a brief (~5 min) PowerPoint presentation based on background research of a term selected at random from a list. The goal is to describe the context, importance, and meaning of a given concept/phenomenon in the context of the relevant material presented in class. The presentation (10% of the grade) needs to be ready prior to the class in which the topic is discussed so that it can be incorporated in the class material (please confirm the exact schedule on the Blackboard).

Midterm and Final:
Both will be take-home papers. Midterm exam will be a sample research proposal (5 pages max) consisting of an original idea for an experiment using one of the techniques covered in the course. It will briefly describe the methods' biophysical and neural principles and will propose the design, experimental parameters, analysis, and interpretation, optimally suited to test the hypotheses (30% of the grade). Similarly, a research proposal presented in the final paper (40% of the grade, 6 pages max) will rely on another method from a different methodological "family" and will showcase the ability to change or adapt the hypotheses to optimally suit the method. In addition, the paper will consider a couple of other literature-based questions. Papers are due by the beginning of class and late submissions will not be accepted.

Grading:

	Points	%
quiz	50 (5*10)	20
presentation	25	10

midterm	75	30
final	100	40
total:	250	100

Grading will be based on 10% increments with a plus/minus system at 3% above and below each cutoff. For example: A = 93% - 100%; A- = 90% - 92%; B+ = 87%-89%; B = 83%-86%, etc.).

Recommended reading:

The following books (the newest editions, two copies each) are available on reserve at the library. They provide excellent and current coverage of the field of cognitive neuroscience but older editions are available at the library as well.

- *Principles of neural science* (2012), Eds. Kandel et al., McGraw-Hill, 5th edition.
- *Cognitive neuroscience: The biology of the mind* (2013), Gazzaniga and Ivry, WW Norton, 4th edition.
- *An introduction to the event-related potential technique* (2014), Luck, MIT Press
- *Functional magnetic resonance imaging* (2014), Huettel et al., Sinauer Assoc.

Other recommended books:

- *Introduction to functional magnetic resonance imaging: principles and techniques* (2009), Buxton, Cambridge University Press
- *Neuroscience: Exploring the brain* (2015), Bear et al., Lippincott, Williams and Wilkins, 4th edition, due in March, 2015.

Please be sure to check the class *Blackboard website* regularly for announcements, reading assignments, extra-credit materials, etc. The syllabus can be found there as well. *Reading assignments* relevant for the next week's lecture will be posted weekly on Blackboard/Course documents and are considered part of the homework assignment. *Lecture slides* will be posted on Blackboard by the evening before the lecture day. They can be enriched with your notes taken during class.

University policies:

Academic dishonesty:

Please consult the SDSU Student Code of Conduct for details, definitions, and regulations regarding actions that are considered inappropriate in the context of academic scholarship. Any form of cheating is considered a very serious violation of academic standards. It is in your best interest to maintain your integrity.

Students with disabilities:

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473 (Calpulli Ctr., ste 3101), more information at: http://www.sa.sdsu.edu/sds/index.html. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Disability Services. Your cooperation is appreciated. Please talk to me privately as soon as possible after getting authorization from Student Disability Services.