

Human Neuroanatomy

Course Number: TBD

Instructor: TBD

email: TBA

Office Hours: TBD

Class Meets: TBD

GSI: TBD

Course Description: The study of how the structure of the brain produces functional networks that contribute to behavior, cognition, and psychological constructs continues to rapidly expand in both basic and translational research. As such, it is becoming increasingly more necessary to first have a basic understanding of the structure of the human brain across spatial scales – from cells to networks. The focus of this course will be building a foundation for this knowledge of human neuroanatomy. While we will also cover functional and cognitive aspects of neuroanatomical features, the focus of the course will be learning the structures that compose the human brain. Other courses are more geared toward understanding the relationship between brain structure and function (for example, Psychology/Cognitive Science 127 and Psychology 117).

Unlike other Neuroanatomy courses offered (for example, Molecular and Cell Biology 163), a majority of this course will cover the human brain (with two lectures on comparative neuroanatomy) and is designed for students who intend to continue their postgraduate education in medical school or either a masters or doctorate degree in a field involving the study of the human brain. Thus, the main intention of the class is to learn the neuroanatomical language of the human brain. Emphasis will be made on understanding the micro- and macroanatomy of the cerebral cortex and the underlying white matter.

Website: The bCourses website will include:

- Lecture slides (provided in advance of class and then updated)
- Reader articles
- Links to the Webcast of each lecture (audio w/ slides)
- Assignments

Textbooks (both in print and e-book):

1. Nolte, John (2009). *The Human Brain: An Introduction to its Functional Anatomy*. With STUDENT CONSULT Online Access, 6th Edition, Mosby Publishers/Elsevier.
2. Nolte, John and Angevine, Jay, B. (2013). *The Human Brain in Photographs and Diagrams* with CD-ROM [Spiral-bound], 4th Edition, St Louis, Mosby Elsevier.

Suggested Resources: Online access to Student Consult provided by Mosby is available with purchase of the Nolte textbook. The website includes reviews of each chapter, plus provides an interactive online neuroanatomy atlas with reviews and quizzes. If knowledge of neuroanatomy will play a prominent role in your future career (e.g., in cognitive neuroscience), purchasing an atlas will be very helpful to have as a general resource.

Lectures and readings:

<i>Lecture</i>	<i>Topic</i>	<i>Textbook/Reader</i>
1	Course overview	
2	History of Neuroanatomy 1	(Reader)
3	History of Neuroanatomy 2	(Reader)
4	Macroanatomy of the cortex 1: Lobes and Gyri	(Chapter 3 + Reader)
5	Macroanatomy of the cortex 2: Lobes and Sulci	(Chapter 3 + Reader)
6	Comparative Neuroanatomy 1: Cortical folding	(Reader)
7	Brain development	(Chapter 2)
8	Macroanatomy of the cortex 3: Sulcal pits and gyral crowns	(Reader)
9	Microanatomy of the cortex 1: Cell types	(Chapters 1 and 20)
10	Microanatomy of the cortex 2: Cytoarchitecture	(Reader; Chapter 22)
11	Microanatomy of the cortex 3: Myeloarchitecture	(Reader)
12	Microanatomy of the cortex 4: Receptor architecture	(Reader)
13	Landmarks 1: Predicting microanatomical structure from sulci and gyri	(Reader)
14	Connectivity 1: White matter	(Chapter 22)
15	Connectivity 2: White matter	(Chapter 22)
16	Connectivity 3: Tracers and electrical stimulation	(Reader)
17	Landmarks 2: Predicting white matter from gray matter	(Reader)
18	Landmarks 3: Functional insight	(Reader)
19	Comparative Neuroanatomy 2: Brain maps across species	(Reader)
20	Meningeal coverings, ventricular system, CSF	(Chapters 4 & 5)
21	Vascularization of the brain	(Chapter 6)
22	Subcortical structures 1	
23	Subcortical structures 2	
24	Cerebellum	

Important dates:

Exam 1: TBD

Exam 2: TBD

Exam 3: TBD

Literature Critique: TBD

Research Proposal: TBD

Program Learning Goals:

As part of a campus-wide project to improve undergraduate education, the Department of Psychology has identified a number of program-level goals for our curriculum. Through the mixture of lectures, readings, section exercises and discussions, as well as the assessments, this course aims to address facets of seven core program-level goals:

1. Understand basic concepts that characterize psychology/neuroscience/neuroanatomy as a field of scientific inquiry, and appreciate the various subfields that form the discipline. As

will be emphasized throughout the course, and in particular emphasized in the initial set of lectures, neuroanatomy is an interdisciplinary field, one that draws on diverse methodologies.

2. Develop an understanding of the central questions/issues in contemporary psychology/neuroscience as well as a historical perspective of theories and key empirical data. The course will examine classic problems in neuroanatomy, using empirical evidence to evaluate models linking neuroanatomical structure to mental function.
3. Develop a thorough understanding of one of the major content areas of psychology (i.e., Social/Personality, Developmental, Clinical, Cognitive, Biological). The focus here will be on the biological areas, although the material will also touch on cognitive, developmental, and clinical issues.
4. Develop skills to critically evaluate the presentation of scientific ideas and research in original scientific papers as well as in the popular media. This goal is at the heart of the teaching philosophy used in this course. The sections are designed to help students develop skills to read and evaluate the primary literature – both historical and modern in nature.
5. Become familiar with research methods used in psychological research, and become proficient in basic concepts of statistical analyses and familiar with more advanced methods in data analyses and modeling. The discussion of the Reader articles will focus on the methods and results sections of the papers, allowing the students to critically evaluate how scientists test and evaluate hypotheses – both historically and in the present.
6. Learn to develop, articulate, and communicate, both orally and in written form, a testable hypothesis, or an argument drawing from an existing body of literature. These skills will be developed in sections through the discussion of the Reader articles and group project. In addition, one section requires that the students critique historical vs. modern methods to examine neuroanatomical features of the brain.
7. Apply a psychological principle to an everyday problem, or take an everyday problem and identify the relevant psychological mechanisms/issues. Understanding cognition is intrinsically interesting to everyone. In addition, the course will address some of the major challenges to cognition that come about from understanding the anatomical organization of the brain – from cells to systems – that serves as the substrate and circuit underlying different facets of cognitive and psychological functions.

Course grading:

The exams, paper, and participation will be weighted as follows:

First Midterm: 25%

Second Midterm: 25%

Third Midterm: 25%

Literature Critique: 10%

Research Proposal: 5%

Section participation: 5%

Class participation (Via Tophat, see below): 5%

All assignments will be graded on a 100-point scale and then weighted by the above formula in the determination of final grades. Grading will most likely be on a straight curve (e.g., B's between 80-89.9), but grades will be curved up if the median of the final distribution is below 80. Under no circumstances will grades be curved down. Concerns with a grade on any assignment must be addressed within two weeks of the return of that assignment. No exceptions.

Exams:

There will be three midterm exams. Each exam will be composed of three parts: 1) multiple choice; 2) short identifications; 3) one essay. There will be a choice for both the identifications and essays (e.g., choose 1 of 2 essays). The third midterm will be given during the final exam slot, although only the first 1.5 hours will be available for the exam. There will not be a cumulative final. Make-up exams are not given except under emergency situations. In such circumstances, the student is responsible for notifying the instructor prior to the exam or as soon thereafter as possible. I will not offer make-ups when there is a delay in notification.

Literature Critique:

The goal of the critique is to get students to read original research articles – either historical or modern – with a focus on the methods used to investigate the question under consideration. Students must review two articles that address a common topic, but use two different methods (e.g., historical methods of cortical thickness in post-mortem brains vs. modern methods of cortical thickness in living brains). The paper will be a maximum of 3-pages (double-spaced). Late papers will be penalized. A detailed description of the assignment will be provided later in the semester.

Research Proposals:

This is a group project, performed in section. Each group will make an oral presentation in section of a research proposal.

Class Participation via Top Hat:

I am experimenting with in-class interactive technology this semester, using the Top Hat platform. Interaction will be via your cell phone (alternative options available upon request). I anticipate using Top Hat input a couple of times each class. Grading of this component will be based on Top Hat registration for attendance and participation in interactive prompts. There are 24 lectures and let's assume there will be two interactive prompts per class. This would produce a total of 75 Top Hat prompts. Your grade for this component will be determined as: # of actual prompts / # of total responses X 100.

Section Participation and RPP/Alternative Assignment:

There are two components to the participation grade. The first is based on your attendance and involvement in section. The second is based on your completion of the research participation program (RPP) requirement or an alternative assignment. Your GSI will provide a grade for participation based on the following guidelines:

PART 1: Section Participation

Someone who came almost every week, was prepared, and participated:	65 - 70
Someone who came almost every week, was prepared, but minimal participation:	60 - 65
Someone who attended most sections and participated when they came:	50 - 60
Someone who attended most sections, but minimal participation:	40 - 50
Someone who attended half and participated when they came:	30 - 40
Someone who attended half with minimal participation:	20 - 30
Someone who rarely attended:	0 - 20

PART 2: RPP Participation or Alternative Assignment

Completion of RPP 3-credit requirement	10 pts/credit
or	or
Satisfactory Completion of Alternative Assignment	30 pts

Research Participation (or alternative assignment):

Students must complete EITHER the Research Participation Program requirement or an alternative assignment.

The RPP program:

- serves as a source of voluntary participants for psychology department and other approved researchers
- respects participant rights and ethical considerations
- provides an educational and positive experience for participants

To learn how to create an RPP account and start participating in experiments, please go to the link:

<http://psychology.berkeley.edu/students/undergraduate-program/research-participation-program>.

Please read the document, "RPP Information for students". Then, set up a Sona account as instructed. We recommend doing this as soon as possible. If you have any questions, you can contact RPP at rpp@berkeley.edu.

The RPP requirement for the class is three credits. The RPP credits must be completed by end of the RPP period, TBD. Consider completing earlier rather than later since demand is sometimes very high near the end of the term.

Alternative Assignment:

Students who prefer to complete an alternative assignment can provide a short research proposal. For this assignment, you would propose a follow-up study to a published study. You would submit a 3-page paper in which you, a) review the goals and key findings of the published study, b) discuss follow-up experiments/measurements to that study, c) describe the methods and show your predicted results (with at least one graph or table). Papers must be posted to the bCourses folder as a single pdf that includes the 3-page paper and the published study. No late papers will be accepted.

Sections:

The main activity in sections will be to discuss the Reader articles. The emphasis here is on learning to read and evaluate original research reports. These can be quite dense and intimidating. With practice you should develop the skill to understand the goal of the study, evaluate the methods and results, and identify questions or future study. To facilitate this skill development, you should prepare as follows each week:

1. You will be required to post a question based on the article to the bcourse website on the evening before your section (by 10 pm). The GSIs will draw on these questions as part of the discussion. More information will be provided at the first section. You are not required to post a question for Reader #1.
2. The GSIs will NOT be lecturing on the Reader articles and instead, will use variants of Socratic methods (https://en.wikipedia.org/wiki/Socratic_method). This will include calling on students (usually at random) to describe the question under study, methods, and results. Be prepared! You don't need to get it "right"—just demonstrate a willingness to think about the material. In addition, one assignment will be completed in section (the research proposal). This assignment will be described in handouts to be provided later in the semester.