

# Phil 151

## Philosophy of Neuroscience

### Winter 2014, Mon., Wed., 5:00-6:20 pm

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## 1. Course Description

Understanding brains, whether in humans or other animals, remains one of the greatest challenges in science. Still, enormous progress has been made as neuroscientists have developed a wide range of research tools for investigating the brain and theoretical perspectives in terms of which they interpret the results of those investigations. This course approaches neuroscience from the perspective of philosophy of science, seeking to understand the strategies scientists use and the character of the knowledge obtained. To understand how current knowledge was obtained, we will examine major examples from the history of neuroscience. We will also, though, be interested in strategies neuroscientists are currently pursuing or those they might pursue in the future. Our objective in examining the research in neuroscience is not to learn all the details of the research, but to put it into perspective. In reading the assignments, you should not focus on memorization, but on figuring out and characterizing how the research is being conducted. Philosophy involves formulating questions, offering possible answers, and critically assessing these answers. It is an activity, not just a body of knowledge and like all activities, is learned through practice. There will be many opportunities for class discussion during the quarter (not just on classes marked as discussion classes), and you should take advantage of these by trying out questions, answers, and criticisms.

## 2. Course Requirements

Class attendance is **mandatory**. Missing classes more than very occasionally will result in a reduction in your grade. To get the most out of the class, it is absolutely essential that you come to class having read the assigned material and being prepared to discuss it. This does not mean that you are expected to understand everything in the assigned reading prior to class. Part of the function of classes will be to clarify and interpret the assigned readings. Clickers will be used in class. Some clicker questions will test *basic* ideas from the assigned reading. On these questions, one point will be awarded for answering the question and a second point for answering correctly. Other questions will not have a specific answer designated and will serve to foster discussion. Two points will be awarded for answering each such question. A cumulative score based on clicker responses will count for 10% of your final grade.

To promote engagement with the reading and to foster subsequent discussions in class, you will be required to email comments or questions on the reading assigned for those classes marked with an asterisk on the Schedule of Class Meetings and Readings below. These emails should be one paragraph in length. You can write about anything you found interesting, puzzling, strange, clearly wrong, provocative, etc. These will be graded as acceptable or unacceptable. To ensure that your submission is acceptable, your comment or question must demonstrate that you have read and thought about the assigned material. (Your paragraph should focus on one specific part of the reading--do not try to discuss everything.) These must be submitted as email (as plain text, **not as attachments**) to [to phil151@mechanism.ucsd.edu](mailto:phil151@mechanism.ucsd.edu) by 7AM on days marked with an asterisk in the schedule of classes below. 10% of your final grade will be based on these email comments.

There will be two exams, a mid-term and a final. The mid-term will count for 25% of your final grade; the final will count

for 30%. Exams will include both short answer and essay questions and the set of questions will be distributed approximately one week before the exams. You will also need to write one 3-5 page paper that will count for 25% of your grade. The paper, due by NOON on Thursday, March 6, must be on one of the topics that will be assigned in class. If possible, the paper should be submitted in Word by email attachment (please be sure to check for viruses before submitting your file!) to [papers@mechanism.ucsd.edu](mailto:papers@mechanism.ucsd.edu).

Above average or below average participation in class discussions can result in a raising or lowering of your final grade from what is determined by the above percentages on these other assignments.

### 3. Texts

Bechtel, W., Mandik, P., Mundale, J., and Stufflebeam, R. (2001). *Philosophy and the Neurosciences: A Reader*. Oxford: Basil Blackwell.

Other reading assignments can be found by following links on the web site. See the schedule of classes and readings below. Those items that are on license to UCSD may only be available if you are on campus or set up a virtual private network (directions on doing so are available through [Academic Computing Services](#)).

If you do not already own one, you will also need to purchase an i-clicker student response transmitter. These transmitters, informally called “clickers,” are available at the UCSD bookstore. Make sure to get an i-clicker and not a different system (e.g., H-ITT or PRS). For more information, visit <http://acms.ucsd.edu/services/classroom-support/clickers.html>.

### 4. Academic honesty

Integrity of scholarship is essential for an academic community. The University expects that both faculty and students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work must be done by the individual who submits it, without unauthorized aid of any kind. This means that on exams you will not use any external resources, including crib sheets, cell phones, etc. All papers, emails, etc., that you submit must be written by you in your own words. If you need to quote someone, be sure to use quotation marks and identify the source. In preparing for exams, papers, etc., you are encouraged to work with your peers. But the actual writing must be yours. You may ask others to read and provide feedback on your writing, but they should not re-write the text for you. Rather, they can provide comments and you undertake the rewriting.

### 5. Email List

There is an email distribution lists for this course. It is required that you subscribe to this list. Do it IMMEDIATELY. You can always unsubscribe later if you drop the course. The purpose of the list is to allow me to distribute information regarding due dates for assignments, changes of schedule, etc. Some of this information is crucial, and some of it may be distributed early on. To subscribe, you simply need to send an email message with *Subscribe* in the header to the following address: [philneuro-subscribe@mechanism.ucsd.edu](mailto:philneuro-subscribe@mechanism.ucsd.edu). After you send the subscribe request, you will receive a reply from [philneuro-subscribe@mechanism.ucsd.edu](mailto:philneuro-subscribe@mechanism.ucsd.edu) that will ask you to confirm your request. Follow the directions in this message to confirm your subscription. If you later want to remove yourself from this list, send email with the header *Unsubscribe* to [philneuro-unsubscribe@mechanism.ucsd.edu](mailto:philneuro-unsubscribe@mechanism.ucsd.edu). At the end of the course I will unsubscribe everyone on the list so you do not have to do this.

Only I have authorization to send mail to this list. There should be no spam. If you receive mail from this list that is not from me, be assured that I will as well and will take measures to block further abuse. (The welcome message you receive suggests that you can send email to the list. Sorry, but you cannot. If there is interest in setting up a voluntary discussion list for the class to which anyone can submit, I am happy to do so, but participation will not make it required.)

## 5. Schedule of Classes and Readings

Note: This schedule of reading assignments is tentative and subject to revision. PNR refers to *Philosophy and the Neurosciences: A Reader* (see above). When powerpoints from lectures are available, there will be a link from the lecture title to the pdf file. Dates with asterisks are dates on which comments/question paragraphs on the reading are due. These comments/questions must be sent to phil151@mechanism.ucsd.edu by 7 AM on the dates indicated.

January 6: [Metaphors and Historical Conceptions of the Brain](#)

Reading:

Daugman, J. G. Brain metaphor and brain theory--Chapter 2 of PNR

January 8: [The Neuroscience of Vision I](#)

Reading:

Introduction to Part III of PNR

Hubel, D. H. and Wiesel, T. N., Brain Mechanisms of Vision--Chapter 10 of PNR

Bechtel, W. Decomposing and Localizing Vision: An Exemplar for Cognitive Neuroscience--Chapter 13 of PNR, pp. 225-233

\*January 13: [The Neuroscience of Vision II](#)

Reading:

Mishkin, M., Ungerleider, L. G., and Macko, K. A. Object Vision and Spatial Vision: Two Cortical Pathways--Chapter 11 of PNR

Bechtel, W. Decomposing and Localizing Vision: An Exemplar for Cognitive Neuroscience--Chapter 13 of PNR, pp. 233-239

Milner, A. D., & Goodale, M. A. (2008). [Two visual systems re-viewed](#). *Neuropsychologia*, 46, 774-785 (read up through 779)

January 15: [The Neuroscience of Vision III](#)

Reading:

van Essen, D. C. and Gallant, J. L. Neural mechanisms of Form and Motion Processing in the Primate Visual System--Chapter 12 of PNR

Bechtel, W. Decomposing and Localizing Vision: An Exemplar for Cognitive Neuroscience--Chapter 13 of PNR, pp. 239-244

\*January 22: Discussion Class

January 27: [Neurophilosophical Foundations I](#)

Readings:

Introduction to Part I of PNR

Bechtel, W, Mandik, P., and Mundale, J. Philosophy meets the Neurosciences--Chapter 1 of PNR

Machamer, P., Darden, L., Craver, C. F. (2000). [Thinking about mechanisms](#). *Philosophy of Science*, 67, 1-25

\*January 29: [Neurophilosophical Foundations II](#)

Reading:

Mundale, J. Neuroanatomical Foundations of Cognition: Connecting the Neuronal Level with the Study of Higher Brain Areas--Chapter 3 of PNR

Recommended Readings:

Matus, A. (2001). [Neurons](#). eLS: John Wiley & Sons, Ltd.

Egri, C., & Ruben, P. C. (2001). [Action Potentials: Generation and Propagation](#). eLS: John Wiley & Sons, Ltd.

February 3: [Neurophilosophical Foundations III](#)

Reading:

Bechtel W. & Stufflebeam, R. S. Epistemic Issues in Procuring Evidence about the Brain: The Importance of Research Instruments and Techniques--Chapter 4 of PNR

Broca, P., Remarks on the Seat of the Faculty of Articulate Language, Followed by an Observation of Aphemia--Chapter 5 of PNR (esp. pp. 87-88 and 92-99)

Petersen, S. E., and Fiez, J. A., The Processing of Single Words Studied with Positron Emission Tomography--Chapter 7 of PNR (esp. pp. 116-122 and 125-128)

Recommended Readings:

Girolamo, G. J., Patel, N., & Becker, B. (2001). [Brain Imaging: Observing Ongoing Neural Activity](#). eLS: John Wiley & Sons, Ltd.

Odludas, Y., & Posner, M. I. (2001). [Brain Imaging: Localization of Brain Functions](#). eLS: John Wiley & Sons, Ltd.

\*February 5: Discussion Class

February 10: Midterm Exam

February 12: [Consciousness I](#)

Readings:

Introduction to Part IV of PNR

Crick, F. and Koch, C. Consciousness and Neuroscience--Chapter 14 in PNR

Prinz, J. A. Functionalism, dualism, and the neurocorrelates of consciousness--Chapter 15 in PNR, pp. 278-284.

Recommended Reading:

Schiff, N. D., & Posner, M. I. (2001). [Consciousness: Mechanisms](#). eLS: John Wiley & Sons, Ltd.

\*February 19: [Consciousness II](#)

Readings:

Hardcastle, V. G. The Nature of Pain--Chapter 16 in PNR

Mandik, P. Points of View from the Brain's Eye View: Subjectivity and Neural Representation--Chapter 17 in PNR

Recommended Reading:

Craig, A. D., & Sorkin, L. S. (2001). [Pain and Analgesia](#). eLS: John Wiley & Sons, Ltd.

February 24: [Representation I](#)

Readings:

Introduction to Part V of PNR

Bechtel, W. Representations: From Neural systems to Cognitive Systems--Chapter 18 in PNR

Grush, R. The Architecture of Representation--Chapter 19 in PNR

February 26: [Representation II](#)

Readings:

Akins, K. (1996): Of Sensory Systems and the 'Aboutness' of Mental States--Chapter 20 in PNR, especially pp. 369-379

Chemero, A. (2001). [Dynamical explanation and mental representations](#). Trends in Cognitive Sciences, 5, 141-142.

Recommended Reading:

Stufflebeam, R. Brain Matters: A case Against Representations in the Brain--Chapter 21 in PNR

\*March 3: Discussion Class

March 5: [Reduction I](#)

Readings:

Churchland, P. M. and Churchland, P. S., Intertheoretic Reduction: A Neuroscientist's Field Guide--Chapter 22 in PNR

McCauley, R., Explanatory Pluralism and the Co-evolution of Theories of Science--Chapter 23 in PNR

Churchland, P. M. and Churchland, P. S., McCauley's Demand for a Co-level Competitor--Chapter 24 in PNR

March 6: Paper due at Noon

March 10: [Reduction II](#)

Readings:

Bickle, J. (2006). [Reducing mind to molecular pathways: explicating the reductionism implicit in current cellular and molecular neuroscience](#). Synthese, 151, 411-434. (Sections 1, 3-5; skim 2)

Bechtel, W. (2009). [Molecules, systems, and behavior: Another view of memory consolidation](#). In Bickle, J. (Editor), *Oxford Handbook of Philosophy and Neuroscience*, (pp. 13-40). Oxford: Oxford University Press. (Sections 1-3; skim 4)

\*March 12: Discussion Class

March 17: Final Exam, 7:00-10:00