

# Phil 151

## Philosophy of Neuroscience

### Winter 2012, Tues., Thurs., 12:30-1:50 pm

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Office Hours: Thursdays, 2:00-3:30 & by appointment

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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. To ensure that this happens and to foster subsequent discussions in class, you will be required to turn in a very short (one paragraph) comment or question on *readings assigned during each week of the quarter*. You can write about anything you found interesting, puzzling, strange, clearly wrong, provocative, etc. Since a major way in which scientists present their findings is through figures and diagrams, at least a couple of your comments should focus on the figures and diagrams in the readings, commenting on the ways they elucidate or obscure the findings or theories presented. Your weekly comments 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 may focus on one specific part of the reading or one figure or diagram--do not try to discuss everything.) These must be submitted as email (as plain text, *not as attachments*) to [phil151@mechanism.ucsd.edu](mailto:phil151@mechanism.ucsd.edu) by 6AM on days marked with an asterisk in the schedule of classes below. You must turn in seven acceptable weekly assignments to receive a passing grade for the course. (If I do not respond with a note that your submission is unacceptable, you can assume that it acceptable.)

Your base grade in the course will be based on two examinations and one 3-5 page paper. The mid-term and final examination will each count for 30% of your grade and the paper will count for 40% of the grade. The paper, due by NOON on Friday, March 2, 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.

### 4. 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 you 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](mailto:phil151@mechanism.ucsd.edu) by 6 AM on the dates indicated.

January 10: Historical roots of neuroscience: The role of metaphor

Reading:

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

January 12: 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 17: 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

## January 19: 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 24: Discussion Class

## January 26: 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 31: 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

Llinas, Rodolfo (2008), [Neuron](#). Scholarpedia, 3(8):1490

Almut Schüz (2008), [Neuroanatomy](#). Scholarpedia, 3(3):3158

## February 2: 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

Petersen, S. E., and Fiez, J. A., The Processing of Single Words Studied with Positron Emission Tomography--Chapter 7 of PNR

## \*February 7: Discussion Class

## February 9: Midterm Exam

## February 14: Consciousness I

## Readings:

Introduction to Part IV of PNR

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

## Prinz, J. A Neurofunctional Theory of Visual Consciousness--Chapter 15 in PNR

## \*February 16: Consciousness II

## Readings:

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

## February 21: Consciousness III

## Readings:

Mandik, P. The Neurobiology and Philosophy of Subjectivity--Chapter 17 in PNR

Mandik, P. (2009). [The Neurophilosophy of Subjectivity](#). In J. Bickle (ed.) Oxford Handbook of Philosophy and Neuroscience. New York: Oxford University Press.

## \*February 23: Discussion Class

## February 28: 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

## \*March 1: Representation II

## Readings:

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

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

## March 6: 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 8: 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.

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.

## March 13: Reduction and Neurodynamics

## Readings:

Bechtel, W. (2012). [Referring to localized cognitive operations in parts of dynamically active brains](#). In A. Raftopoulos and P. Machamer (Eds.), *Perception, Realism and the Problem of Reference*.

Cambridge: Cambridge University Press.

\*March 15: Discussion Class

March 20: Final Exam, 11:30 to 2:30