**THE UNIVERSITY OF WESTERN ONTARIO**
**DEPARTMENT OF PHILOSOPHY**
**Undergraduate Course Outline 2021-22**

# Philosophy 3450F: Philosophy of Neuroscience

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| Fall Term 2021-2022 | Instructor: Jacqueline Sullivan |
| Mondays: 9:30-11:20 a.m. | Office: Rotman Institute, 7170 WIRB |
| Wednesdays: 9:30-10:30 a.m. | Office Hours: TBD |
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| | TAs: TBD |

## COURSE DESCRIPTION

During the past three decades neuroscience has made major strides in advancing our understanding of the brain and nervous system, consciousness, cognition and behavior. Such advances have prompted interest in neuroscience among philosophers of mind and philosophers of science, leading to the creation of two new philosophical research areas: "neurophilosophy" and "philosophy of neuroscience". Neurophilosophers are interested in questions such as: Are mental states nothing over and above brain states? How does the brain enable subjective and emotional experiences, higher-order consciousness, sensation, perception and cognition? What kinds of claims about traditional philosophical issues such as the mind-brain relationship, free will, mental illness and human morality can be made on the basis of neuroscientific data? What are the implications of neuroscience for the law? What are the ethical implications of enhancing or altering human brain function? Philosophers of neuroscience, in contrast, are concerned with questions like: What kinds of assumptions inform neuroscientific research? What makes for good or reliable neuroscientific experiments? What kinds of considerations should inform the development of classification systems for understanding cognition or mental illness?

In this course we will address each of these questions. The course should be of interest to students majoring in philosophy, psychology, cognitive science and/or neuroscience.

## TEXTS

A combination of philosophical and scientific (i.e., methodological, research and review

papers/chapters) articles extracted from philosophical and scientific journals, books, textbooks, and anthologies will be made available to students as PDF files on OWL.

**OBJECTIVES**

Students who successfully complete this course will have a basic understanding of specific aspects of neuroscience and a detailed understanding of the major philosophical issues that arise in the philosophy of neuroscience and neurophilosophy. They will also have gained fundamental training in reading and interpreting seminal works in philosophy of neuroscience and neurophilosophy as well as the skills requisite to critically evaluate this work and formulate and defend their own arguments on topics that interest them.

**REQUIREMENTS**

There are 4 paper assignments for this course that in combination are worth 100% of the grade. Here is the breakdown:
(1) Paper 1: (15%): Due Sept. 22
(2) Paper 2: (20%): Due Oct. 18
(3) Paper 3: (32%): Due Nov. 8
(4) Paper 4: (33%): Due Nov. 29

The ability to write a strong paper for each assignment will depend crucially on you having done the assigned readings for the course and having watched the recorded (Zoom or VoiceThread) and live (Zoom) lectures each week. I will pass out questions for these writing assignments at least 2-3 weeks before each paper is due. I will provide explicit directions with respect to how the papers should be structured as well as the grading rubric.

Papers are to be submitted via the "Turn It In" link on the OWL course website. As the instructor and TA will be grading the papers anonymously, please do not place identifying information on your paper. Papers submitted after the due date will lose 5 points/day and will not be accepted past the 10th day after the due date.

The instructor will provide explicit directions as well as topics for each paper. She will either set aside class time to talk about the papers—how they are to be structured and what the precise requirements are—or she will create brief instructional videos to explain each paper assignment.

The instructor and the TAs will share responsibilities for gra

**DEPARTMENT OF PHILOSOPHY POLICIES**

The **Department of Philosophy Policies** which govern the conduct, standards, and expectations for student participation in Philosophy courses is available in the Undergraduate section of the Department of Philosophy website at http://uwo.ca/philosophy/undergraduate/policies.html.
It is your responsibility to understand the policies set out by the Senate and the Department of Philosophy, and thus ignorance of these policies cannot be used as grounds of appeal.

**ACCOMMODATION**

Students seeking academic accommodation on medical grounds for any missed tests, exams,

participation components and/or assignments worth 10% or more of their final grade must apply to the Academic Counselling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department. Documentation shall be submitted, as soon as possible, to the Office of the Dean of the student's Faculty of registration, together with a request for relief specifying the nature of the accommodation being requested. The UWO Policy on Accommodation for Medical Illness and further information regarding this policy can be found at
http://uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

**SELF- REPORTED ABSENCE FORM**

Students who experience an unexpected illness or injury or an extenuating circumstance (48 hours or less) that is sufficiently severe to temporarily render them unable to meet academic requirements (e.g., attending lectures or labs, writing tests or midterm exams, completing and submitting assignments, participating in presentations) should self-declare using the online Self-Reported Absence portal. This option should be used in situations where the student expects to resume academic responsibilities within 48 hours or less.
The following conditions are in place for self-reporting of medical or extenuating circumstances:
http://westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#SubHeading_322

**EVALUATION OF ACADEMIC PERFORMANCE**

At least three days prior to the deadline for withdrawal from a course without academic penalty, students will receive assessment of work accounting for at least 15% of their final grade. For 3000- or 4000-level courses in which such a graded assessment is impracticable, the instructor(s) must obtain an exemption from this policy from the Dean and this exemption must be noted on the corresponding course syllabus. In rare instances and at the Dean's discretion, other courses could receive a similar exemption, which also must be noted in the course syllabus.

**COURSE ASSIGNMENT**

The last day of scheduled classes in any course will be the last day on which course assignments will be accepted for credit in a course. Instructors will be required to return assignments to students as promptly as possible with reasonable explanations of the instructor's assessment of the assignment.

**ACADEMIC OFFENCES**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

**PLAGIARISM CHECKING**

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com http://www.turnitin.com.

**SUPPORT SERVICES**

Registrarial Services http://www.registrar.uwo.ca
Student Support Services https://student.uwo.ca/psp/heprdweb/?cmd=login
Services provided by the USC http://westernusc.ca/services/
Student Development Centre http://www.sdc.uwo.ca/

Students who are in emotional/mental distress should refer to Mental Health@Western http://www.uwo.ca/uwocom/mentalhealth/ for a complete list of options about how to obtain help. Immediate help in the event of a crisis can be had by phoning 519.661.3030 (during class hours) or 519.433.2023 after class hours and on weekends.

**SELF- REPORTED ABSENCE FORM**

Students who experience an unexpected illness or injury or an extenuating circumstance (48 hours or less) that is sufficiently severe to temporarily render them unable to meet academic requirements (e.g., attending lectures or labs, writing tests or midterm exams, completing and submitting assignments, participating in presentations) should self-declare using the online Self-Reported Absence portal. This option should be used in situations where the student expects to resume academic responsibilities within 48 hours or less.
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## Tentative Schedule of Classes

Sept 8 (W) - **Course Overview**– The aims of this first lecture will be to provide a historical introduction to the course, to describe briefly the topics that we will consider during the course of the term and to identify course requirements. There are two background readings for this class out on Owl. I will review the main points from these readings on Sept. 14.

- **Paper assignment #1 distributed**

Sept 13 (M) – Introduction to philosophy of neuroscience and the brain

I will use the time to talk about the readings and course requirements in more detail, explaining what is required for the first paper assignment. I will use additional time left over to provide students with a very general introduction to the parts of the brain and areas of neuroscience that study complex phenomena such as perception, consciousness and higher-level cognition.

- Patricia Churchland (1988), "The Significance of Neuroscience for Philosophy" *TINS* 11(7): 304-307.
- Patricia Churchland & Terrance Sejnowski (1988), "Perspectives on Cognitive Neuroscience" *Science* 242: 741-745.

**Part 1. Consciousness and Its Neural Correlates** – Philosophers historically have been interested in the nature of consciousness, seeking to answer questions such as: "What is consciousness? "What differentiates conscious from unconscious things? Why is there consciousness at all?" Researchers and clinicians are interested in defining consciousness, because how the concept and related concepts are defined (e.g., "awake", "aware", "unconscious", "chronically vegetative") informs how we medically respond to and ethically treat humans and non-human animals. Neuroscientists are interested more specifically in the neural correlates of consciousness—i.e., the patterns of brain activity that underlie consciousness (defined generally) or specific conscious states (e.g., being aware of the words on this page). Since at least the 1980s, there has been a rich body of neuroscientific research aiming to illuminate the neural correlates of consciousness.

We begin this section with an early paper by Neurophilosopher Patricia Churchland, who was the first philosopher to make the case that philosophical work on consciousness should be informed by findings from consciousness research in neuroscience. We will then turn to a paper by philosopher of mind, David Chalmers, who identifies the conceptual and investigative challenges that researchers who seek to identify the neural correlates of consciousness face. The third (Koch et al.) and fourth papers (Tononi & Koch) that we will consider are written by neuroscientists who have actively worked in the field of consciousness research (e.g., Christof Koch and Giulio Tononi). These papers are somewhat technical, but fear not—the aim of having you look at them and us talking about them is to provide you with some sense of where consciousness research in neuroscience is currently and where it is headed. The final paper we will consider on consciousness is a paper by Davinia Fernandez Espejo and Adrian Owen (who is a neuroscientist here at Western) on detecting awareness in individuals who are in chronic vegetative states and the clinical and ethical implications of their research findings.

**Tentative Schedule of Classes**

**Part 1. Consciousness and Its Neural Correlates**

Sept 15 (W): Patricia Churchland, (2005) "A Neurophilosophical Slant on Consciousness Research", *Progress in Brain Research* 149: 285-293.

Sept 20 (M): David Chalmers, "On the Search for the Neural Correlate of Consciousness", pp. 1-12. *Toward a Science of Consciousness II: The Second Tucson Discussions and Debates* (S. Hameroff, A. Kaszniak, and A.Scott, eds), published with MIT Press in 1998.
**Watch David Chalmers' TED Talk:**
https://www.ted.com/talks/david_chalmers_how_do_you_explain_consciousness/footnotes?la
**Paper Assignment #2 Distributed**

Sept 22 (W): Christof Koch, Marcello Massimini, Melanie Boly and Giulio Tononi (2016) "Neural correlates of consciousness: progress and problems" *Nature Reviews Neuroscience* 17: 307-321.
https://www.youtube.com/watch?v=R4SYxTecL8E&t=9s
**Paper Assignment #1 Due**

Sept 27 (M): Giulio Tononi, Christof Koch, (2014) "Consciousness: here, there and everywhere?" *Philosophical Transactions of the Royal Society B (Biological Sciences*) 370: 20140167.
**Watch Tononi video**:
https://www.youtube.com/watch?v=huxh9YCL5nM&t=1095s

Sept 29 (W): Fernández-Espejo, D., & Owen, A. M. (2013). Detecting awareness after severe brain injury. *Nature Reviews Neuroscience*, 14(11), 801–809.
**Watch Adrian Owen's TED Talk https://youtu.be/lvUvY_JrUgA**
ADDITIONAL SUGGESTED READINGS:
Graham, M., et al. (2015). An ethics of welfare for patients diagnosed as vegetative with covert awareness. AJOB Neuroscience, 6(2), 31-41.
Peterson, A, et al. (2013). Assessing decision-making capacity in the behaviorally nonresponsive patient with residual covert awareness. AJOB Neuroscience, 4(4), 3–14.

**Part 2. Volition, Responsibility, Morality and the Brain** – Another issue that intersects philosophy and neuroscience is the question of free will. Do we have free will? Does neuroscience have anything relevant to say on the matter? We will begin this part of the course with a paper by philosopher and neuroscientist Adina Roskies, in which she lays out different positions that may be adopted in response to the free will question and makes some claims about what light neuroscience may shed on the nature of free will. We will then evaluate a paper by scientist Benjamin Libet, who conducted experiments with humans that he believed provided evidential support for the claim that human agents lack "free will" but instead have something

that he dubbed "free won't". We will move on to consider the use of neuroscientific evidence in legal contexts. Increasingly, neuroscientific evidence is being admitted into the courtroom in the context of criminal cases in order to mitigate punishment of the accused. We will read several papers on the admissibility of neuroscientific evidence into the courtroom. We will then consider a paper by Adina Roskies in which she urges caution with respect to admitting evidence from functional magnetic resonance imaging (fMRI) experiments into the courtroom and we will briefly discuss some of the limitations of fMRI that she identifies in her paper. We will end the section with a paper by neuroscientist Joshua Greene, which draws a set of conclusions about human moral judgements and their neural underpinnings on the basis of a set of experiments that his research team conducted.

**Free will and moral responsibility**

Oct 4 (M): Adina Roskies (2006), "Neuroscientific Challenges to Free Will and Moral Responsibility." *Trends in Cognitive Sciences* 10(9): 419-423.

Oct 6 (W): Benjamin Libet, (1999) "Do we have free will?" *Journal of Consciousness Studies 6, No. 8-9, pp. 47-57.*
Watch a modern version of the Libet Experiment: https://www.youtube.com/watch?v=IQ4nwTTmcgs&t=10s
Libet Experiment Explained & Criticized: https://www.youtube.com/watch?v=OjCt-L0Ph5o
**Optional readings, but potentially relevant to Paper Assignment #3:**
Adina Roskies (2012). How does the neuroscience of decision-making bear on our understanding of responsibility and free will? *Current Opinion in Neurobiology* 22(6), 1022-1026.
[Also may be of interest Benjamin Libet, Anthony Freeman and Keith Sutherland, "Editor's Introduction: The Volitional Brain: Towards a Neuroscience of Free Will", *Journal of Consciousness Studies* 6, No. 8-9, pp. izxxiii.]

Oct 11 (M): Thanksgiving Holiday

Oct 13 (W): Libet Lecture
**Paper Assignment #3 Distributed**

***On the admissibility of neuroscientific evidence in the courtroom***

Oct 18 (M): Jones, OD, Wagner, AD, Faigman, DL, & Raichle, ME (2013). Neuroscientists in court. *Nature Reviews Neuroscience*, 14(10), 730–736.
- Jeffrey Burns, Russell Swerdlow (2003) "Right Orbitofrontal Tumor With Pedophilia Symptom and Constructional Apraxia Sign", *Archive of Neurology* 60: 437-440.

**Paper Assignment #2 Due**

Oct 20 (W): Adina Roskies (2008). "Neuroimaging and inferential distance: The Perils of Pictures" *Neuroethics* 1(1): 19-30.
- Baron, E. & Sullivan, J. (2018). "Judging Mechanistic Neuroscience: A Preliminary Conceptual-Analytic Framework for Evaluating Scientific Evidence in the Courtroom. *Psychology, Crime and Law* 24(3): 334-351.

***What some neuroscientific evidence indicates about the neural basis of morality***

Oct 25 (M): Greene, J. (2003). "From neural 'is' to moral 'ought': What are the moral implications of neuroscientific moral psychology?," *Nature Reviews Neuroscience*, 4:847-850.

**Part 3 Topics.** In the final part of the course, we will consider a set of topics at the intersection of neurophilosophy and philosophy of neuroscience.

We will begin with a paper by neurophilosopher Kathleen Akins, which challenges traditional philosophical assumptions about the nature of sensory perception. Akins evaluates thermoreceptors—receptors in the skin that convey information about temperature—and makes the case that these receptors belie traditional folk and philosophical understandings of sensation and perception. One upshot of Akins' paper is that if philosophers and neuroscientists begin with folksy, philosophical or pre-scientific ideas about how perception works, they may fail to understand how the nervous system actually works. Her claims are applicable with respect to other sensory and perceptual systems, such as the visual system (consider Goodale & Milner's work on perception for action).

Then, we will address some epistemic issues that have arisen in the neuroscientific study of cognition and mental illness. Historically, the concepts that we use to understand human cognition, including belief, fear, attention, declarative memory and reward learning (to name only a handful) originated with either "folk psychology" (i.e., ordinary everyday understandings of these terms) or scientific psychology, which has sought to operationalize these terms (that is specify conditions for their application). Some philosophers and neuroscientists have argued that such terms do not reflect real divisions in the causal structure of human cognition and that these terms will eventually be replaced by terms that better reflect our neural architecture. We will briefly consider a paper by neurophilosopher, Paul Churchland, who first argued for this idea in the 1980s and then read a more recent paper by Jolien Francken and Marc Slors (2014), which emphasizes the unavoidable role that commonsense concepts play in neuroscience and the enables an appreciation of the difficulties that would arise if we try to abandon these concepts.

The next paper we will consider, by Bruce Cuthbert and Thomas Insel (2010), describes a similar kind of shift in the classification of mental illness away from traditional categories and towards a set of categories that better reflects the multi-level mechanisms (from molecules, to cells, to circuits, to behavior) that cause mental illness. Since the 1950s, the main classification system that has been used to understand and conceptualize mental illness in North America is the *Diagnostic and Statistical Manual of Mental Disorders,* which is now in its 5$^{th}$ edition (DSM-5). Cuthbert and Insel argue, however, that the DSM is an inappropriate taxonomy for guiding scientific discovery into the causes of mental illness and that a different taxonomy—one that identifies the kinds of psychological functions that are disrupted in mental illness--should be used for scientific research.

We will then consider the importance of diversity and collaboration in the scientific study of cognition and mental illness. We will consider several recent papers by (1) Vonetta Dotson and Audrey Duarte (2020), (2) Martha Farah (2019) and (3) Liisa Galea and colleagues (2020) that

emphasize the relevance of investigating the impact of variables such as race, sex and socioeconomic status on cognition and mental illness for the generalizability of results in cognitive neuroscience. We will also read a paper that I wrote (Sullivan 2017) on the kind of collaboration required in neuroscience to move discovery into the neural bases of cognition and the causes of mental illness forward.

We will end the term with a discussion about the ethics of changing your brain and thus changing your mind by considering different forms of neural enhancement (Farah 2012) and the purported therapeutic benefits hallucinogens (Barrett & Griffiths 2018).

**Sensation, Sensory Representations and the Brain:**

Oct 27 (W): Kathleen Akins (1996), "Of Sensory Systems and the Aboutness of Mental States" *Journal of Philosophy* 93(7): 337-372.

**The Neuroscientific Study of Cognition and Mental illness**

Nov 1 (M)- Nov 5 (W): Reading Week

Nov 8 (M): Francken, J.C. and M. Slors (2014). "From commonsense to science and back: The use of cognitive concepts in neuroscience". *Consciousness and Cognition* 29: 248-258.
Paul Churchland (1981), "Eliminative Materialism and the Propositional Attitudes", *Journal of Philosophy* 78(2): 67-90. – I will begin the lecture by briefly talking about Churchland's argument but the main focus of this lecture will be Francken & Slors paper
**Paper Assignment #3 due**
**Paper Assignment #4 distributed**

Nov 10 (W): Cuthbert, B. & Insel, T. (2013) Toward the future of psychiatric diagnosis: the seven pillars of RDoC. *BMC Medicine* 11: 136.

**The Importance of Diversity and Collaboration in Neuroscience**

Nov 15 (M): [**This lecture will be recorded and place online rather than in person]**

- Dotson, Vonetta and Duarte, Audrey. (2020). "The Importance of Diversity in Cognitive Neuroscience" *Annals of the New York Academy of Sciences* 1464:181–191.
- Farah, M. (2019). Biological Psychiatry and Socioeconomic Status. *Biological Psychiatry* 86: 877-878.

Nov 17 (W): Liisa A.M. Galea, Elena Choleris, Arianne Y.K. Albert, Margaret M. McCarthy, Farida Sohrabji (2020). "The Promises and Pitfalls of Sex Difference Research", *Frontiers in Neuroendrocrinology* 56.

Nov 22 (M): Sullivan, Jacqueline, (2017). "Coordinated Pluralism as a Means to Facilitate Integrative Taxonomies of Cognition" *Philosophical Explorations.*
**Watch this talk online:**
https://streaming.mu.edu/hapi/v1/contents/permalinks/r9P6CpXw/view#

**Neural Enhancement**

Nov 24 (W): Martha J. Farah (2012). "Neuroethics: The Ethical, Legal and Societal Impact of Neuroscience. *Annual Review of Psychology* 63: 571-91.

**Hallucinogens, Mystical Experiences and Neural Correlates**

Nov 29 (M): Barrett, F. & Griffiths, R. (2018). "Classic Hallucinogens and Mystical Experiences: Phenomenology and Neural Correlates", *Current Topics in Behavioral Neuroscience* 36: 393-430.
*******Paper assignment 4 due*******

Dec 1 (W): Course Conclusion