

**Neuroscience & Society**  
**PSYC W3496**

Course Information

Location: 405 Schermerhorn  
Fall 2016  
Tuesdays, 12:10-2pm

Instructor Information

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Office hours: tktk or by appt.  
Location: Tktk

***Course Bulletin Description:*** This course investigates the ways in which research in human neuroscience both reflects and informs societal issues. Topics include how neuroscience research is interpreted and applied in areas such as healthcare, education, law, consumer behavior, and public policy.

***Prerequisites:*** At least two psychology courses plus permission of the instructor.

***Full Description:*** This course considers the role of social and cognitive neuroscience in society, specifically, how our understanding of the brain can be applied – and potentially misapplied – in areas such as social and economic policy, healthcare, education, and law. This course is grounded in recent findings in neuroscience. In addition to evaluating these findings on their own merits, we will also discuss their potential societal implications. Questions we will explore include: How does our understanding of adolescent brain development affect culpability in the juvenile justice system? How does neuroscience inform our understanding of cultural differences? How can we use neuroscience to offer better treatment to those suffering from mental illness or chronic pain? Can we use findings from neuroscience in the classroom, in the marketplace, or on the campaign trail? What are the ethical implications of neuroenhancement and neurotherapeutics?

This course comprises mini-lectures on seminal findings in social and cognitive neuroscience, along with discussion of the broader implications of these findings and the potential application of these findings. The goal is to critically evaluate how the burgeoning fields of social and cognitive neuroscience can both remedy and problematize important societal issues.

***Role of PSYC S3496 in the Psychology Curriculum:*** PSYC W3496 is a seminar designed especially for undergraduates majoring in Psychology or Neuroscience and Behavior and for students participating in the Psychology Post-Baccalaureate Certificate Program. It will fulfill the following degree requirements:

- For the Psychology major or concentration in the College and in the School of General Studies, for the Psychology minor in Engineering, and for the Psychology Post-Baccalaureate Certificate Program, this class will meet the Group II (Psychobiology & Neuroscience) distribution requirement.
- For the Neuroscience and Behavior joint major, it will fulfill the fifth Psychology requirement for “one advanced psychology seminar from a list approved by the Psychology Department advisor to the program.”

- For the Psychology Post-Baccalaureate students and for Psychology majors who entered Columbia in Fall 2013 or later, it will fulfill the seminar requirement.
- For the Barnard Psychology major, this class will fulfill the senior seminar requirement.

**Readings:** There is no textbook required for this course. Readings will comprise empirical articles, literature reviews, and commentaries in the fields of social and cognitive neuroscience. The readings listed in the Schedule below are provisional but illustrative of the types of articles we will be reading and discussing. All readings will be posted in PDF form on CourseWorks.

**Schedule:** The calendar below details topics, readings, and assignments for each class period. Typically, each class period will begin with a short lecture providing the background in neuroscience necessary to better explore the issue of the day. The majority of class time will be devoted to student presentations and student-led discussions (detailed in **Course Requirements**). As an example, for the class on Pain and the Brain, I will give a brief lecture on the neural correlates of pain and the placebo effect, providing an overview of the field and highlighting recent findings from empirical research. Then one student may present the findings and implications of the Broderson et al. (2012) article and another might present the findings and implications of the Wager et al. (2013) article. Then, the remainder of class time will be devoted to a discussion addressing questions such as, How does our understanding of the neural signatures of pain inform our understanding of pain diagnoses and analgesic drug prescriptions in clinical settings? How can physicians use our understanding of the brain-basis of placebo effects to improve clinical care? Will/should neuroimaging ever supplant subjective pain ratings in clinical settings?

The schedule of topics is somewhat flexible and can be altered to reflect the interests of the class. Students are responsible to be prepared to discuss the assigned readings for each class period. Optional, supplementary readings are also included for those who might be interested in exploring a particular topic in more depth.

<i>Date</i>	<i>Topics &amp; Assignments</i>	<i>Readings</i>
Sept. 6	Neuroscience: Historical and Philosophical Background	Introduction and Neuron chapters of Brain Facts: A Primer on the Brain and Nervous System, (2012) <i>Society for Neuroscience</i> , 4-13.  Bassett, D. S., & Gazzaniga, M. S. (2011). Understanding complexity in the human brain. <i>Trends in Cognitive Sciences</i> , 15(5), 200-209.
Sept. 13	Neuroimaging: What It Can and Cannot Tell Us  <i>Reading Response due</i>	Poldrack, R. A. (2008). The role of fMRI in cognitive neuroscience: Where do we stand? <i>Current Opinion in Neurobiology</i> , 18(2), 223-227.  Poldrack, R. A., & Farah, M. J. (2015). Progress and challenges in probing the human brain. <i>Nature</i> , 526(7573), 371-379.

		<p><u>Supplementary:</u> Rosen, B. R., &amp; Savoy, R. L. (2012). fMRI at 20: Has it changed the world?. <i>Neuroimage</i>, 62(2), 1316-1324.</p>
Sept. 20	<p>Poverty and Brain Development</p> <p><i>Reading Response due</i></p>	<p>Luby, J., Belden, A., Botteron, K., Marrus, N., Harms, M. P., Babb, C., ... &amp; Barch, D. (2013). The effects of poverty on childhood brain development: The mediating effect of caregiving and stressful life events. <i>JAMA Pediatrics</i>, 167(12), 1135-1142.</p> <p>Hair, N. L., Hanson, J. L., Wolfe, B. L., &amp; Pollak, S. D. (2015). Association of child poverty, brain development, and academic achievement. <i>JAMA Pediatrics</i>, 169(9), 822-829.</p> <p><u>Supplementary:</u> Farah, M. J., Noble, K. G., &amp; Hurt, H. (2005). Poverty, privilege, and brain development: empirical findings and ethical implications. <i>Neuroethics in the 21st Century</i>, 1-27.</p>
Sept. 27	<p>The Adolescent Brain</p> <p><i>Reading Response due</i></p> <p><i>Paper Proposal due</i></p>	<p>Chick, C. F. (2015). Reward processing in the adolescent brain: Individual differences and relation to risk taking. <i>The Journal of Neuroscience</i>, 35(40), 13539-13541.</p> <p>Cohen, A. O., &amp; Casey, B. J. (2014). Rewiring juvenile justice: the intersection of developmental neuroscience and legal policy. <i>Trends in Cognitive Sciences</i>, 18(2), 63-65.</p> <p><u>Supplementary:</u> Galván, A. (2014). Insights about adolescent behavior, plasticity, and policy from neuroscience research. <i>Neuron</i>, 83(2), 262-265.</p>
Oct. 4	<p>Culture, Intergroup Relations and the Brain</p> <p><i>Reading Response due</i></p>	<p>Krosch, A. R., &amp; Amodio, D. M. (2014). Economic scarcity alters the perception of race. <i>Proceedings of the National Academy of Sciences</i>, 111(25), 9079-9084.</p> <p>Golby, A. J., Gabrieli, J. D., Chiao, J. Y., &amp; Eberhardt, J. L. (2001). Differential responses in the fusiform region to same-race and other-race faces. <i>Nature Neuroscience</i>, 4(8), 845-850.</p> <p><u>Supplementary:</u> Quadflieg, S., Turk, D. J., Waiter, G. D., Mitchell, J. P., Jenkins, A. C., &amp; Macrae, C. N. (2009). Exploring the neural correlates of social stereotyping. <i>Journal of Cognitive Neuroscience</i>, 21(8), 1560-1570.</p>

Oct. 11	<p>The Moral and Empathic Brain</p> <p><i>Reading Response due</i></p>	<p>Banissy, M. J., Kanai, R., Walsh, V., &amp; Rees, G. (2012). Inter-individual differences in empathy are reflected in human brain structure. <i>Neuroimage</i>, 62(3), 2034-2039.</p> <p>Decety, J., Skelly, L. R., &amp; Kiehl, K. A. (2013). Brain response to empathy-eliciting scenarios involving pain in incarcerated individuals with psychopathy. <i>JAMA Psychiatry</i>, 70(6), 638-645.</p> <p><u>Supplementary:</u> Moretto, G., Làdavas, E., Mattioli, F., &amp; Di Pellegrino, G. (2010). A psychophysiological investigation of moral judgment after ventromedial prefrontal damage. <i>Journal of Cognitive Neuroscience</i>, 22(8), 1888-1899.</p>
Oct. 18	<p>Mind-reading, memory, and the law</p> <p><i>Reading Response due</i></p> <p><i>First Draft due</i></p>	<p>Rissman, J., Greely, H. T., &amp; Wagner, A. D. (2010). Detecting individual memories through the neural decoding of memory states and past experience. <i>PNAS</i>, 107(21), 9849-9854.</p> <p>Greene, J., Paxton, J. and Raichle, M.E. (2009) Patterns of neural activity associated with honest and dishonest moral decisions. <i>PNAS</i>, 106(30), 12506-12511.</p> <p><u>Supplementary:</u> Schachter, D.L. &amp; Loftus, E.F. (2013). Memory and law: What can cognitive neuroscience contribute? <i>Nature Neuroscience</i>, 16, 119-123.</p>
Oct. 25	<p>Neuro-enhancement</p> <p><i>Reading Response due</i></p>	<p>Kadosh, R. C., Levy, N., O'Shea, J., Shea, N., &amp; Savulescu, J. (2012). The neuroethics of non-invasive brain stimulation. <i>Current Biology</i>, 22(4), R108-R111.</p> <p>Greely, H., Sahakian, B., Harris, J., Kessler, R. C., Gazzaniga, M., Campbell, P., &amp; Farah, M. J. (2008). Towards responsible use of cognitive-enhancing drugs by the healthy. <i>Nature</i>, 456(7223), 702-705.</p> <p><u>Supplementary:</u> Talbot M. (2009). Brain gain. <i>The New Yorker</i>, April 27, 2009, 32-43.</p>
Nov. 1	<p>Psychiatry and the Brain</p> <p><i>Reading Response due</i></p>	<p>McGrath, C. L., Kelley, M. E., Dunlop, B. W., Holtzheimer III, P. E., Craighead, W. E., &amp; Mayberg, H. S. (2014). Pretreatment brain states identify likely nonresponse to standard treatments for depression. <i>Biological Psychiatry</i>, 76(7), 527-535.</p>

		<p>Casey, B. J., Craddock, N., Cuthbert, B. N., Hyman, S. E., Lee, F. S., &amp; Ressler, K. J. (2013). DSM-5 and RDoC: Progress in psychiatry research?. <i>Nature Reviews Neuroscience</i>, <i>14</i>(11), 810-814.</p> <p><u>Supplementary:</u> Kapur, S., Phillips, A. G., &amp; Insel, T. R. (2012). Why has it taken so long for biological psychiatry to develop clinical tests and what to do about it? <i>Molecular Psychiatry</i>, <i>17</i>(12), 1174-1179.</p>
Nov. 8	University Holiday	Vote!
Nov. 15	<p>The Brain and Pain</p> <p><i>Reading Response due</i></p>	<p>Wager, T. D., Atlas, L. Y., Lindquist, M. A., Roy, M., Woo, C. W., &amp; Kross, E. (2013). An fMRI-based neurologic signature of physical pain. <i>New England Journal of Medicine</i>, <i>368</i>(15), 1388-1397.</p> <p>Brodersen, K. H., Wiech, K., Lomakina, E. I., Lin, C. S., Buhmann, J. M., Bingel, U., ... &amp; Tracey, I. (2012). Decoding the perception of pain from fMRI using multivariate pattern analysis. <i>Neuroimage</i>, <i>63</i>(3), 1162-1170.</p> <p><u>Supplementary:</u> Denk, F., McMahan, S. B., &amp; Tracey, I. (2014). Pain vulnerability: A neurobiological perspective. <i>Nature neuroscience</i>, <i>17</i>(2), 192-200.</p>
Nov. 22	<p>Neuro-education?</p> <p><i>Reading Response due</i></p>	<p>Hook, C. J., &amp; Farah, M. J. (2013). Neuroscience for educators: What are they seeking, and what are they finding?. <i>Neuroethics</i>, <i>6</i>(2), 331-341.</p> <p>Carew, T. J., &amp; Magsamen, S. H. (2010). Neuroscience and education: An ideal partnership for producing evidence-based solutions to guide 21st century learning. <i>Neuron</i>, <i>67</i>(5), 685-688.</p> <p><u>Supplementary:</u> Ansari, D., De Smedt, B., &amp; Grabner, R. H. (2012). Neuroeducation—a critical overview of an emerging field. <i>Neuroethics</i>, <i>5</i>(2), 105-117.</p>
Nov. 29	<p>Neuro-marketing &amp; Neuro-politics?</p> <p><i>Reading Response due</i></p>	<p>Amodio, D. M., Jost, J. T., Master, S. L., &amp; Yee, C. M. (2007). Neurocognitive correlates of liberalism and conservatism. <i>Nature Neuroscience</i>, <i>10</i>(10), 1246-1247.</p>

		<p>Plassmann, H., O'Doherty, J., Shiv, B., &amp; Rangel, A. (2008). Marketing actions can modulate neural representations of experienced pleasantness. <i>Proceedings of the National Academy of Sciences</i>, 105(3), 1050-1054.</p> <p><u>Supplementary:</u>  Ariely, D. and Berns, G. S. (2010) Neuromarketing: The hope and hype of neuroimaging in business. <i>Nature Reviews Neuroscience</i>, 11(4), 284-292.</p>
Dec. 6	Neuro-humanities & neuro-aesthetics?	<p>Thierry, G., Martin, C. D., Gonzalez-Diaz, V., Rezaie, R., Roberts, N., &amp; Davis, P. M. (2008). Event-related potential characterisation of the Shakespearean functional shift in narrative sentence structure. <i>Neuroimage</i>, 40(2), 923-931.</p> <p>Chatterjee, A., &amp; Vartanian, O. (2014). Neuroaesthetics. <i>Trends in Cognitive Sciences</i>, 18(7), 370-375.</p> <p><u>Supplementary:</u>  Brown, S., Gao, X., Tisdelle, L., Eickhoff, S. B., &amp; Liotti, M. (2011). Naturalizing aesthetics: Brain areas for aesthetic appraisal across sensory modalities. <i>Neuroimage</i>, 58(1), 250-258.</p> <p>Kandel, E. R. (2013). What the brain can tell us about art. <i>New York Times Sunday Review</i>, April 12, 2013, 14.</p>
Dec. 12	<i>Final Paper Draft due</i>	

***Course requirements:***

Class preparation and participation: The assigned readings are designed to expand your knowledge of neuroscience and to hone your critical thinking skills. The topics we'll tackle this semester are complex, so we will have a lot to discuss and debate. Strong preparation and participation will enable us to have high-level, thought-provoking discussion.

Thorough reading enables thoughtful discussion. Towards that end, you will be asked to submit a short (one-paragraph) reading response to CourseWorks by 6:00pm the night before each class period. The goal of these reading responses is to help you keep current on course topics. The reading responses also help me to understand where students may have had difficulty with the readings and which topics students were most intrigued by and, therefore, which areas may warrant more focus during class time. Each reading response should be no more than a short paragraph, either discussing something

interesting you found in the readings or asking substantive questions about concepts in the reading you found challenging. As the goal of these assignments is to keep you up to speed and to help guide my teaching and our class discussions, the assignments will just be graded on a pass/fail basis. (I can only accept responses submitted before the deadline.)

When discussing the implications and applications of neuroscience findings to societal issues, there is a great deal of gray area and many more questions than answers. In many ways, there are no right vs. wrong answers – but there are more vs. less carefully and thoughtfully argued answers. To ensure that everyone is accountable for thoroughly engaging with the material during class discussions, your active participation in these discussions will contribute to your final grade. I do understand that for some people participating regularly in class discussions can be difficult. Those students who might be concerned about their ability to contribute to class discussions should see me. In such cases, we might be able to work out a way for you to participate thoughtfully through your reading responses.

Generally speaking, effective class preparation and participation could include:

- Asking insightful or clarifying questions.
- Connecting the reading to other reading we've done in the course or reading you've done on your own, drawing parallels and/or contrasts among findings.
- Actively listening to fellow classmates and responding to their ideas.
- Offering thoughtful critiques of the research methodology and providing suggestions for how it might be improved.
- Bringing in outside sources – potentially from the news media or other sources – that shed light on neuroscience findings or that illustrate ways in which these findings are interpreted and applied.

Leading discussions: You will be responsible for presenting an article and leading the class discussion for at least two class meetings. I'll provide more information and give a demonstration of the sort of presentation I'm looking for in the first week of class. But, briefly, you'll walk us through your assigned article, describing the methods and results, highlighting any strengths or weaknesses of the study design, and giving your thoughts on the meaning and importance of the findings. I'll ask you to complete a handout and email that to me at least two days before the date of your presentation, so that I can provide feedback in advance of your actual presentations. As the goal is for you to become more skilled in presenting research findings and leading discussions, in calculating grades, the second presentation will be weighted more heavily than the first.

Societal issue paper: Early in the course, you will be asked to choose a societal issue or problem on which neuroscience might shed some light. The range of potential topics is almost limitless but could include such topics as universal early childhood education, addiction, PTSD, aging, traumatic brain injury in sports or combat, etc. etc. You just want to choose a topic that is appropriately narrow to address in an 8-10 page (not including references) paper.

We will discuss this paper in greater depth during class, but, briefly, you'll be asked to submit a proposal, a first draft, and a final draft. You'll first be asked to submit a topic proposal, which will include a short paragraph about your intended topic and a list of at least five (and no more than 10) references you intend to use. I will make suggestions regarding focus, potential sources, etc. Once your topic is approved, you will begin work on a first draft of the paper. The paper will first describe the societal problem or issue, then review some key findings from human neuroscience that bear on the issue, and finally analyze how this research suggests potential remedies or interventions, how it problematizes the issue, how it calls into question previous approaches to the issue, how it might be misinterpreted or misapplied, and so on.

Good writing is good thinking, and a primary goal of this assignment is to help you hone your writing and critical thinking skills. Towards that end, I will provide comments and suggestions on your first draft, and you will be expected to make substantive changes – not just copyediting, but rather larger edits such as, reworking entire sections, drawing on new sources, and providing more analysis. The final draft of the paper will be graded not only as a standalone paper but also in how it demonstrates improvement upon the earlier draft.

**Grading:** Grades will be calculated based on the percentages outlined below.

A. Class preparation and participation.....	25%
• Reading responses	10%
• Contribution to class discussion	15%
B. Discussion leading.....	35%
• First presentation	15%
• Second presentation	20%
C. Societal issue paper.....	40%
• Proposal	5%
• First draft	10%
• Final draft	25%

***Class policies:***

Academic integrity: As members of this academic community, we are responsible for maintaining the highest level of personal and academic integrity: “[E]ach one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.... The exchange of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and carefully credited. In practical terms, this means that, as students, you must be responsible for the full citations of others’ ideas in all of your research papers and projects... [and] you must always submit your own work and not that of another student, scholar, or internet agent” (from the Columbia University Faculty Statement on Academic Integrity:

<https://www.college.columbia.edu/faculty/resourcesforinstructors/academicintegrity/statement>). Plagiarism – whether intentional or inadvertent – is a serious violation of academic integrity. If you have any questions about what constitutes plagiarism and/or



how to properly cite sources, please come to me. I am more than happy to help. Similarly, if you put yourself in a situation, e.g., starting an assignment very late, in which you think your best option might be to cut some corners, see me. It is far better to have a few points deducted from a paper than to compromise your academic integrity and potentially put your academic standing in jeopardy.

Attendance: Class participation is the foundation of this course. Of course, there are times when life gets in the way of things, but more than one absence will be detrimental to your learning – and to your grade. As long as an excused absence is documented (e.g., a dean's note), it will not negatively impact your grade, but please inform me of the absence as soon as possible. You will still be responsible for the work due in that class, e.g., reading responses and interim deadlines for the final paper.

Late assignments: It is not fair for you to get more time on your assignments than your peers. If there's an appropriate reason for turning an assignment in late, please discuss it with me well in advance so that we can work out an arrangement. I will have to penalize late assignments.

Class Etiquette: Research shows that many of us think we're good multi-taskers. Research also shows that most of us are not. If you typically take notes or read papers on a laptop, you can, of course, use the laptop in class. But, out of respect for your classmates and in the interest of your own learning and ability to actively participate in class discussions, please refrain from using your laptop inappropriately.

Students with Disabilities: Students with special needs who may require classroom/assignment accommodations should make an appointment with me before or during the first week of class. You should also contact the Office of Disability Services (ODS) in Lerner Hall before the start of the course to register for these accommodations. The procedures for registering with ODS can be found at <http://health.columbia.edu/services/ods> or by calling (212) 854-2388.

Syllabus is subject to revision. Updates will be posted on CourseWorks.