Course title: Neuroscience for Humanities and Social Sciences
Language of instruction: English
Professor: Fernando Giraldez
Professor’s contact and office hours:
CEXS-UPF, at PRBB c/Dr. Aiguader 88, 08003, Barcelona
Office: 328.06. Office hours: 9am-5pm
Phone: 933160838
fernando.giraldez@upf.edu
Course contact hours: 45
Recommended credit: 3 US credits-5 ECTS credits
Course prerequisites: There are no prerequisites for this course.
Language requirements: None
Number of students (max.): 20

Course focus and approach:
Neurosciences study the brain, from genes and cells to behavior and it has provided radical new clues about how the brain works. This knowledge has strong implications for many areas of human activity outside the conventional environment of medicine or psychology, and expands to economics, laws, philosophy or art. On the other hand, Neuroscience has attracted the attention of society, sometimes beyond evidence. The course focuses on a solid dialogue between neurosciences and humanities.

Course description:
This is an accessible account of selected areas of Neurosciences of particular interest for Humanities and Social Sciences. The course starts with a general overview of the brain to then review how the sensory systems build up a representation of the world, with particular reference to the visual and auditory systems. Then we analyze examples of the constructive character of perception, brain categorization, and the construction of sensory images, space and movement. Finally, we address the question of consciousness and perception of self, to discuss the implications of Neurosciences in the foundations of knowledge, Law and Arts.

Learning objectives:
Major goals are:
1) To understand the basic principles of brain function.
2) To understand the neural basis of perception.
3) To be able to apply knowledge in Neurosciences to central problems of Philosophy, Law, Communication and Arts.

Course workload: The course is based on discussion sessions and lectures. Students will read 4 short papers (two-three pages), 5 fragments or book chapters and write 2-4
short papers/reports (one page) along the course. Students will do a 10 minute oral presentation to the class. There will be a mid-term and a final exam.

**Teaching methodology:** The course will be developed inspired in the flipper classroom, combined with a set of lectures and seminars. Lectures are intercalated with discussion sessions. Materials, power point PDFs, handouts and readings will be available in advance. There will be some selected lectures given by guest speakers. Seminars consist of problem solving, paper discussions and general discussions with invited speakers. Demonstrations include animations and interactive materials.

Activities will be developed in English.

It is expected that students contribute with their own background to discussions and works.

**Assessment criteria:**
Midterm exam: 30%
Final exam: 30%
Class participation: 20%
Term paper and class presentation: 20%

**Midterm and final exams** consist of an assay with four to five questions or problems to solve.

**Term paper and class presentation.** For the Student Talks (STs), students will make an oral presentation to their classmates and teachers. Students will select a topic from a list of offered articles, or they may propose their own before week 5. They have to deliver an abstract by week 8, when presentations begin. The activity includes: 1) One page abstract of no more than 550 words (Arial 10) containing the relevant information and three references. A figure may be included if appropriate. 2) A talk of 10 minutes + 10 minutes discussion. 3) The presentation will be on the blackboard, a so-called "chalk talk", Power-Point not allowed.

**Absence policy**

After the add/drop, all registrations are considered final and HESP Absence Policy begins to apply. For the academic year 2017-2018, such policy is as follows:

*Attending class is mandatory and will be monitored daily by professors. Missing classes will impact on the student’s final grade as follows:*

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<tr>
<th>Absences</th>
<th>Penalization</th>
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<tr>
<td>Up to two (2) absences</td>
<td>No penalization</td>
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<tr>
<td>Three (3) absences</td>
<td>1 point subtracted from final grade (on a 10 point scale)</td>
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<td>Four (4) absences</td>
<td>2 points subtracted from</td>
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<th>final grade (on a 10 point scale)</th>
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<td>Five (5) absences or more</td>
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<td>The student receives an INCOMPLETE (&quot;NO PRESENTAT&quot;) for the course</td>
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The PEHE/HESP attendance policy does not distinguish between justified or unjustified absences. The student is deemed responsible to manage his/her absences.

Emergency situations (hospitalization, family emergency...) will be analyzed on a case by case basis by the Academic Director of the HESP.

Classroom norms:
- No food or drink is permitted in class
- Students will have a ten-minute break every one-hour session.

Weekly schedule (6/7/17)

**Week 1 Introduction to the course**

**Lesson 1. Introduction to the course I**
Optical illusions show how we see a TED talk by Beau Lotto
https://www.ted.com/talks/beau_lotto_optical_illusions_show_how_we_see
Seminar 1.

**Lesson 2 Introduction to the course II** From genes to neurons and circuits. What is inside the brain.
Seminar 2. Discussion

Reading assignments:
What is Neuroscience? BrainFacts.org
http://www.brainfacts.org/about-neuroscience/what-is-neuroscience/
Do we see reality as it is? a TED talk by Donald Hoffman:
https://www.ted.com/talks/donald_hoffman_do_we_see_reality_as_it_is

**Week 2 What is perception? The representation of the world**

**Lesson 3. The representation of the world: the sensory systems.** The organization of sensory systems: parallel processing sensory receptors, brain localization, distortion, top-down and bottom-up processing.
Seminar 3. The Sensory Systems

**Lesson 4. The visual world: from the retina to the brain.** Why we like line drawings?. Rods and cones. Retinal processing and contrast. The smile of Mona Lisa.
Seminar 4. What happens in the retina

Reading assignments:
Vilis, T. (2014) L1The eye http://www.tutis.ca/Senses/L1Eye/L1eye.swf
BrainFacts.org A primer on the brain and Nervous System.
Chapter 3, 18-24 http://www.brainfacts.org/~media/Brainfacts/Article Multimedia/About Neuroscience/Brain Facts book.ashx

**Week 3 The visual brain: shapes and space in art**

**Lesson 5. The visual areas in the brain.** How do we identify objects? Feature extraction. The brain is kantian: brain categorisation, shape and objects. The conceptual neurons "face cells", the "object cells". Bosch and “the garden of earthly delights"

**Seminar 5.** The visual cortex

**Lesson 6. The construction of space.** Binocular cues and monocular spatial reconstruction. From Fra Angelico to Sorolla: looking at the history of painting. Why they were so great. Magritte and Picasso: how to subvert the law.

**Seminar 6.** Space in painting

**Reading assignments:**
Vilis, T L2 The visual cortex http://www.tutis.ca/Senses/L2VisualCortex/l2v1.swf

**Week 4 The visual brain: colours, art and brain.**

**Lesson 7. Is colour in our brain?** What is colour and the construction of colour and light. The colour opponent theory. From medieval miniatures to Mondrian

**Seminar 7.** Colours, demos and questions.

**Reading assignments:**
Vilis, T. (2014) L1The eye http://www.tutis.ca/Senses/L1Eye/L1eye.swf
Vilis, T L2 The visual cortex http://www.tutis.ca/Senses/L2VisualCortex/l2v1.swf

**Lesson 8. Neuroscience and art.** Beauty and meaning. The evolutionary history of the beauty and history of art. Aesthetic universals?. Artists as intuitive neurologists. Is cubism a neurological fiasco?

**Seminar 8** Neuroscience and art and general MT pre-exam review.

**Reading assignments:**

**Week 5 Art and Brain**

**Visit to the National Art Museum of Catalonia (MNAC)**

**Mid-term exam**
Week 6 Brain and Music.

Lesson 9 Hearing. The inner ear. The auditory brain. Auditory objects. Sound localisation: what we learn from owls and bats
Seminar 9. Audition demos and questions. MT exam review.

Reading assignments:

Seminar 10: The musicians as magicians: music tells a lot about the brain.

Reading assignments:
http://www.pnas.org/content/110/Supplement_2/10430.long

Week 7 Neurosciences and Philosophy

Lesson 11 Perception and knowledge: the myth of the cave and the neurosciences. The question of how we know the world.
Seminar 11 Reading on knowledge.
Reading assignments: Plato, The Republic, book VII:
http://www.gutenberg.org/files/1497/1497-h/1497-h.htm
Noam Chomsky (2011) The machine, the ghost and the limits of understanding https://www.youtube.com/watch?v=D5in5EdjhD0

Lesson 12 Genes and culture I: Early experience and perception. The “critical periods” of post-natal development. Brain plasticity: interactions between the brain and the environment.
Seminar 12 Genes and culture


Week 8 Neurosciences and Philosophy

Seminar 13 Discussion seminar

Reading assignments:
Critical periods. Society for Neurosciences http://www.brainfacts.org/Brain-Basics/Brain-Development/Articles/2012/Critical-Periods
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<th>Week</th>
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<tr>
<td>9</td>
<td>Student's “chalk-talks”</td>
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<tr>
<td>10</td>
<td>Student's “chalk-talks”</td>
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<td>11</td>
<td>Final exam</td>
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**Required readings:**

**Textbooks on Neuroscience**

**Online books on Neuroscience and Philosophy**