Course title: Neuroscience for Humanities
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-6 ECTS credits
Course prerequisites: There are no prerequisites for this course.
Keywords: Neurosciences, Perception, Mind, Art, Philosophy, Law.
Language requirements: None

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. The course focuses in the dialogue between neurosciences and humanities, breaking the gap between CP Snows’ “Two Cultures”.

Course description: include here a brief description of the course contents (about 100 words)
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: All courses should have a list of at least three academic goals clearly stated and defined by professor.
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 and Arts..

Course workload: The course is based on lectures and discussion sessions. Students will read 4 short papers (two-three pages) and write 2 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 in a 2 hour class/session of a set of lectures (50%), seminar session (30%) and demonstrations (20%).

Lectures are developed in 45 minutes and materials, power point PDFs, 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: 10%
Term paper and class presentation: 30%

Midterm and final exam consist of an assay with four to five questions or problems to solve (typically in one written page)

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 2014-2015, 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:

<table>
<thead>
<tr>
<th>Absences</th>
<th>Penalization</th>
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<tbody>
<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>
</tr>
<tr>
<td>Four (4) absences</td>
<td>2 points subtracted from final grade (on a 10 point scale)</td>
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Hispanic and European Studies Program

| Five (5) absences or more | The student receives an INCOMPLETE (“NO PRESENTAT”) for the course |

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 after one one-hour session

Weekly schedule (April 1st, 2014)

Week 1.
Tuesday
Lesson 2. The evolution of the brain. How to explore the brain.

Thursday
Lesson 3. The representation of the world: the sensory systems. Organization of sensory systems: parallel processing sensory receptors, cerebral localization, distortion. Top-down and bottom-up processing.
Seminar 1. How the brain works.

Reading assignments:
Kandel et al. (2013) The Brain and Behavior, in Principles of Neural Science chapter 1, pages 5-20
http://www.brainfacts.org/~/media/Brainfacts/Article_Multimedia/About Neuroscience/Brain Facts book.ashx

Week 2.
Tuesday
Lesson 5. The visual areas in the brain. Feature extraction. The kantian brain. Brain categorisation: shape and objects. The conceptual neurons “face cells”, the "object cells”.

Thursday
Lesson 6. The construction of space. Binocular cues and monocular spatial reconstruction. The “place cells” and "grid cells": the Euclidean space in the brain. From Fra Angelico to Sorolla. The "tromp d’oeil"
Seminar 2. The visual brain

Reading assignments:
### Week 3.

**Tuesday**  
**Lesson 7.** Colour: what is colour and the construction of colour and light. Colour contrast. From medieval miniatures to Mondrian.  
**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?

**Thursday**  
**Lesson 9.** Beauty and Neuroscience.  
Invited talk and discussion seminar. *Thinking the Middle Ages: Images, simulacra and phantasmata* by Prof. María Morrás, UPF

**Reading assignments:**  
Zeki (1997) Statement on Neuroesthetics  
http://www.neuroesthetics.org/statement-on-neuroesthetics.php  

### Week 4.

**Tuesday**  
**Lesson 10** Hearing. The inner ear. The auditory brain. The auditory space.  
**Seminar 4** Audition

**Thursday**  
**Lesson 11** Music, hearing and brain. From hair cells of ecstasy. The role of anticipation. Music and language. Music and pleasure  
**Seminar 5** Audition and music

**Reading assignments:**  
Vilis (2014) L9 Hearing  
http://www.tutis.ca/Senses/L9Auditory/L9Auditory.swf  
http://www.pnas.org/content/110/Supplement_2/10430.long

### Week 5.

**Tuesday**  
**Lesson 12.** Smell, taste and flavour. The Proust's madeleine and the roots of neurogastronomy.  
**Mid-term exam**

**Thursday**  
**Lesson 13** Mirror neurons and dance.  
Invited talk and discussion seminar by Prof. Natalia Gozzano, Academia Nazionale di Danza.

**Reading assignments:**
http://www.nature.com/nature/journal/v444/n7117/full/nature05405.html

Week 6

Tuesday

Lesson 14 Genes and culture: Early experience and perception. The “critical periods” of post-natal development. Brain plasticity: interactions between the brain and the environment. The question of “nature and nurture”

Seminar 6 Genes and culture

Thursday

Lesson 15 Perception and consciousness. The problem of consciousness is it a scientific problem?. Do animals have consciousness? The levels of consciousness and states of consciousness. The perception of oneself. The body image.

Seminar 7. Consciousness

Reading assignments:
Kandel et al. (2013) Experience and refinement of synaptic connections in Principles of Neural Science, chapter 56, pages 1259-1283
Ryle(1949) The concept of mind. Chapter 1, Descarte’s myth pages 1-12

Week 7

Tuesday

Lesson 16 Conditions of knowledge: epistemology and neuroscience. Objectivity and truth. What is causality?

Seminar 8 On knowledge

Thursday

Lesson 17 The religious brain. Myths and beliefs. Invited talk and discussion seminar by Prof. Emilio Suarez, UPF “The origins of myths”

Reading assignments:
Fingelkurts et al. (2009) Is our brain hardwired to produce God or is our brain hardwired to percieve God? Cogn. Process 10:293-326

Week 8

Tuesday

Lesson 18 Neurosciences and Law. Subjective responsibility. The question of the determination and free will. Invited talk and discussion seminar by Prof. ML Iglesias, UPF

Thursday

Student term paper presentations ST1

Reading assignments:
Ryle(1949) The concept of mind. Chapter III, The will, pages 49-68
Week 9

Tue

Student term paper presentations ST2

Thu

Student term paper presentations ST3

Week 10

Tue

Seminar 9 General discussion

Thu

Final exam

Recommended bibliography: (ordered from most general to specific)


Further reading (following the order of lessons)


http://www.nature.com/nrn/journal/v14/n10/full/nrn3565.html
http://www.pnas.org/content/110/Supplement_2/10430.long
http://www.nature.com/nature/journal/v444/n7117/full/nature05405.html
http://nba.uth.tmc.edu/neuroscience/
http://sites.nationalacademies.org/PGA/stl/PGA_062477