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-5 ECTS credits
Course prerequisites: There are no prerequisites for this course.
Keywords: Neurosciences, Perception, Mind, Art, Philosophy, Law.
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: 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 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>
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<tr>
<td>Four (4) absences</td>
<td>2 points subtracted from final grade (on a 10 point scale)</td>
</tr>
<tr>
<td>Five (5) absences or more</td>
<td>The student receives an INCOMPLETE (“NO PRESENTAT”) 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 after one one-hour session

**Weekly schedule (start Tue Jan13 )**

**Week 0**

**Lesson 1.** Introduction to the course I

**Lesson 2.** Introduction to the course II

**Week 1**

**Lesson 3** The evolution of the brain. How to explore the brain.

**Seminar 1.** How the brain works

**Lesson 4.** The neurons and the brain. Historical ideas on the brain. Basic principles of neuron function. Neuronal circuits and brain areas.

**Seminar 2.** How the brain works.

**Reading assignments:**
Kandel et al. (2013) The Brain and Behavior, in Principles of Neural Science chapter 1, pages 5-20
Week 2

Lesson 5. 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 3. Sensory Systems


Seminar 4. The retina

Week 3

Lesson 7. The visual areas in the brain. Feature extraction. The kantian brain. Brain categorisation: shape and objects. The conceptual neurons "face cells", the "object cells".

Seminar 5. The visual cortex

Reading assignments:
Vilis, T. (2014) L1 The eye http://www.tutis.ca/Senses/L1Eye/L1eye.swf
Vilis, T L2 The visual cortex http://www.tutis.ca/Senses/L2VisualCortex/l2v1.swf

Week 4

Lesson 8. The construction of space. Binocular cues and monocular spatial reconstruction. From Fra Angelico to Sorolla. The "tromp d’œil"

Seminar 6. Space in painting


Seminar 7. Colours

Reading assignments:
Vilis, T. (2014) L1 The eye http://www.tutis.ca/Senses/L1Eye/L1eye.swf
Vilis, T L2 The visual cortex http://www.tutis.ca/Senses/L2VisualCortex/l2v1.swf

Week 5


Seminar 8 Neuroscience and art.

Invited talk and discussion seminar. Thinking the Middle Ages: Images, simulacra and phantasmata by Prof. María Morrás, UPF

Seminar 9 On images and phantasmata

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

Week 6

Mid-term exam

**Lesson 12** Hearing. The inner ear. The auditory brain. The auditory space. Music, hearing and brain: from hair cells of ecstasy.
**Seminar 10** Audition and music

**Reading assignments:**

Week 7

**Lesson 13.** Smell, taste and flavour. The Proust's madeleine and the roots of neurogastronomy.
**Seminar 11.** Smell tricks

**Thursday**
**Lesson 14** Mirror neurons, visual arts and dance.
Invited talk and discussion seminar by Prof. Natalia Gozzano, Academia Nazionale di Danza.
**Seminar 12** Mirror neurons

**Reading assignments:**

Week 8

**Lesson 15** 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 13** Genes and culture

**Lesson 16** Perception and knowledge: epistemology and neuroscience. Objectivity and truth. What is causality?
**Seminar 14** Reading on knowledge

**Reading assignments:**
Kandel et al. (2013) Experience and refinement of synaptic connections in Principles of Neural Science, chapter 56, pages 1259-1283
**Week 9**

**Lesson 17** "Knowledge and theory of mind" More on knowledge Invited talk and discussion seminar by Prof. Danielle Cozzoli UPF  
**Seminar 15** Discussion seminar

**Lesson 18** Neurosciences and the Law. Subjective responsibility. The question of the determination and free will. Invited talk and discussion seminar by Prof. ML Iglesias, UPF  
**Seminar 16** Discussion seminar

**Reading assignments:**  
[http://www.pnas.org/content/107/10/4499.long](http://www.pnas.org/content/107/10/4499.long)  
Ryle(1949) The concept of mind. Chapter III, The will, pages 49-68

**Week 10**

**Student term paper presentations ST1**

**Student term paper presentations ST2**

**Week 11**

**Student term paper presentations ST3**  
**Seminar 17** General discussion

**Week 12**

**Final exam**
Recommended bibliography: (ordered from most general to specific)


Further reading (following the order of lessons)
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