M.S. in Behavior and Cognition

Human Brain Function (5 credit points ECTS)

Coordinator:

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Objectives

The human brain is with no doubt the most complex existing entity, and understanding its functional organization is an extraordinary challenging task, one that requires the synergetic cooperation of specialists from biology, psychology, medicine, engineering, physics and possibly many others. Hopefully, recent methodological and particularly theoretical advances have made it possible a substantial progress towards the understanding of its organization and function, and how it does allows human behavior. The purpose of the present course is to review these advances to provide the student with a modern, comprehensive view of the human brain function. Also, the roots of these advances will be reviewed so that the student is able to understand why we conceive brain function as we do at present. Finally, it is important to note that this course in not taken from any specific handbook but represents the personal view of its coordinator. An ultimate, practical goal of the course will be to appraise that research into the neural substrates of cognitive functions cannot be approach by merely combining a problem of cognitive science with a method of the neurosciences, but needs be derived from a brain function hypothesis.

Methodology

As in some other courses of this program, we believe that knowledge networks are more effective when discovered than when taught, and therefore the course is organized as a journey through a series of some the key papers that conform our current understanding of brain function. Through this readings and their discussion, the student should be able to build his/her own perspective on human brain function.

The course will be organized during three consecutive weeks, at a rate of one two-hours session per day. The course will combine formal lectures by the course staff, classroom presentations by the students of selected topics of the syllabus, and a journal club. The journal club will set the presentation and discussion of specific empirical papers.

Program

1. Emerging principles in human brain function: the module, the neural representation, the neural networks
2. From wet to digital neurobiology: neuroanatomy, neurophysiology, neurochemistry
3. Beyond the corticocentric myopia: subcortical contributions to human cognition
4. EEG, beyond evoked potentials: the oscillatory brain activity
5. Predictive coding and perception: the case of audition
6. Attention and working memory
7. The sensitive brain and the emotions

Bibliography [sorted by course topics]

1. Cerebral representation


2. Digital neurobiology


3. Subcortical cognition


4. Brain waves


5. Predictive coding


Evaluation criteria

The evaluation of the course will be based on three criteria:

1. Course attendance (20%)
2. Contribution to class presentations, class discussion and journal club (40%)
3. Final exam, including specific short or multiple-choice question, and a short opinion assay (40%)