Dottorato in Neuroscienze

Corso di MATLAB a.a. 2018-2019

MATLAB	6 hours Credits: 3

Proponent: Tommaso Costa

Location: Aula 9, C.so San Maurizio 31/a

Dates: September 11th and September 12th, 2019 - 10.00-13.00

Program:

The aim of the course is to acquaint the student with a programming environment and development that will enable him to perform many of the tasks of preparing statistics for neuroscience experiments.
During the course the student will learn the techniques to develop programs in matlab for statistical analysis, to perform experiments and analysis of signals. At the end of the course the student will be able to conduct experiments and statistical analysis in neuroscience.
 The course covers the following topics:
1) the matlab environment
2) basic operations
3) data handling
4) plotting data
5) start programming
6) sound management
7) image processing
8) signal and data analysis
9) experimental set
10) neuroimaging analysis

Dottorato in Neuroscienze

Programmazione didattica a.a. 2018-2019

Reasoning	6 hours Credits: 3

Proponent: Monica Bucciarelli

Location: Palazzo Badini, Aula Seminari, via Verdi 10

Dates: May 29 and May 31, 2019 - 9.30-12.30

Program:
The course will deal with reasoning processes, both automatic and deliberate, underlying the inferences we make in everyday and scientific research contexts. It will be concerned with deduction and induction, as well as abduction, namely the classical method used in scientific research with the aim to infer the causes from the effects and build theories. Also, the course will deal with typical reasoning errors, with reference to biases and heuristics. The awareness of the processes underlying reasoning and of the influencing factors is particularly relevant to reason correctly from the methodological point of view in the scientific domain.

The (Neuro)science of Bodily Self-Consciousness	5 hours Credits: 2

Proponent: Lorenzo Pia

Location: Palazzo Badini, Aula Seminari, Via Verdi 10

Dates: TBD (March)

Program:
The course aims to give students advanced theoretical and methodological knowledge on state-of-the-art research around bodily self-consciousness. Indeed, recent multidisciplinary studies on the fields of neurology, artificial intelligence, psychology, virtual reality clearly have allowed opening new avenues to investigate the neurocognitive mechanisms underlying a fundamental sense of the bodily self in humans.
During the lessons, I will present the most recent techniques (e.g., psychophysical paradigms, neuroimaging, lesion mapping, robotics etc.) to study the neural roots of the bodily-self body perception, cognition, and self-consciousness. This, allows to shed light on some of the key features of the topic as, for instance, the role of efferent/afferent signals or the contribute of self-location/first-person perspective.

Neuro-psychology of cognitive impairment in minor and major neurocognitive disorders

18 hours   Credits: 9

Proponent: Martina Amanzio

Teachers: Martina Amanzio (4 h), Adriano Chiò (4 h), Leonardo Lopiano (4 h), Innocenzo Rainero (4 h), Sara Palermo (2 h)

Location and dates:

Innocenzo Rainero
Sept 4, 2019   (h 14-16)   AULA via Cherasco 15, first floor
Sept 11, 2019 (h 14-16)   AULA via Cherasco 15, first floor

Martina Amanzio
Sept 20, 2019 (h 14-16)   AULA Istituto Plana, Via Plana 10
Sept 27, 2019 (h 14-16)   AULA Istituto Plana, Via Plana 10

Adriano Chiò
Sept 6, 2019 (h 14-16)   AULA via Cherasco 15, first floor
Sept 13, 2019 (h 14-16)   AULA via Cherasco 15, first floor

Leonardo Lopiano
Sept 10, 2019 (h 14-16)   AULA Magna, Via Cherasco 15
Sept 17, 2019 (h 14-16)   AULA Magna, via Cherasco 15

Sara Palermo
Oct 4, 2019 (h 14-16)   AULA Istituto Plana, Via Plana 10

Program:
The course is aimed at:
- Let students know the neuropsychology of cognitive dysfunctions along a continuum ranging from normal aging, to minor and major neurocognitive disorders.

- To provide a thorough neuropsychological knowledge of Mild Cognitive Impairment and cognitive frailty, Alzheimer's Disease, Frontotemporal Lobar Degeneration and Parkinson's Disease.

- To understand the mechanisms and consequences of cognitive impairment in motor neuron disease.

- To present the recent international guidelines to achieve the best diagnostic assessment.

- To foster in students skills about the executive dysfunction in reduced awareness of illness using a neurocognitive approach.

Chemical Neuroanatomy: an introduction to the morphology studies of the Nervous System

4 hours   Credits: 2

Proponent: Stefano Gotti

Location: Anatomy

Dates: TBD (2nd Semester)

Program:
morphology of the nervous cells; overview of the principal technics used in neuroanatomy: histochemistry, immunohistochemistry, in situ hybridization, autoradiography, tracers

Neuroendocrinology and Behaviour

8 hours   Credits: 4

Proponent: Giancarlo Panzica

Location: Anatomia Umana, Aula C, C.so Massimo d'Azeglio 52

Dates: TBD (April-May 2019)

Program:

- Definition of Neuroendocrine system
- The central nervous system is at the same time an endocrine gland and a target organ for body's hormones
- How the hormones shape the brain during the development
- Gonadal hormones and sex differences in brain and behaviour
- The neuroendocrine control of feeding behaviour and metabolism
- The stress axis
- Hormones and social behaviours (pair bonding, paternal and maternal behaviour, aggressive behaviour)
- The hypothalamus-pituitary-thyroid axis
- Endocrine Disruptors: their effects on brain and behaviour development and functioning

Ca^{2+}, Na$^+$ and K$^+$ channelopathies   **5 hours   Credits: 2**

Proponent: Emilio Carbone

Location: Corso Raffaello 30

Dates: TBD (July 1-15)

Program:

Structure & function of voltage-gated calcium channels (2 hours)
        L-type channelopathies (1 hour)
        Nav channelopathies (1 hour)
        Kv channelopathies (1 hour)

Recording and stimulation techniques in Neuroscience   **16 hours   Credits: 8**

Proponents: Filippo Tempia, Benedetto Sacchetti, Francesco Ferrini, Eriola Hoxha, Giulia Concina

Location: Physiology Hall B, Corso Massimo d'Azeglio 50

Dates: March 6, 13, 20, 27, April 3 (9:30-11:30), Room B of Physiology (Corso Massimo d'Azeglio 50)
March 28, April 4 (14-17), Room C of Physiology (Corso Massimo d'Azeglio 50)
(Room subject to change. Final notice of the class room will be given as soon as possible)

Program:
1. In vitro techniques:
   a. intra- and extra-cellular recording, micro-electrode arrays (MEAs) (2 h, Tempia, Hoxha)
   b. patch-clamp, (2 h, Tempia, Hoxha)
   c. optical methods (calcium, voltage imaging) (1 h, Tempia, Hoxha)

2. applications of in vitro recordings:
   a. membrane excitability and voltage-dependent currents (1h, Tempia, Hoxha)
   b. excitatory synaptic transmission (2 h, Ferrini)
   c. inhibitory synaptic transmission (2 h, Ferrini)

3. in vivo techniques:
   a. Local field potentials in vivo recording (1.5 h, Sacchetti, Concina)
   b. Multi (MUA) and single unit in vivo recording (1.5 h, Sacchetti, Concina)
   c. Optogenetic and DREADD stimulation/inhibition techniques (3 h, Sacchetti, Concina)

"Neurobiologically based" psychological treatments of traumas and depression

10 hours   Credits: 5

Proponents: Riccardo Torta, Luca Ostacoli

Location: Aula Baldacci, SSD Psicologia Clinica, AOU S. Giovanni Battista

Dates: January 31 (8.30-13.30); February 6 (8.30-13.30)

Program:
There is an evident relationship between both psychic and physical diseases and past traumatic events: every life event may become "traumatic" when overcomes the person's coping skills and leads to pathogenic memories. Life events may precipitate the onset of the disease and its evolution; major adverse childhood experiences, such as abuse or domestic violence, increases the risk to develop both psychic disorders and medical illnesses such as heart disease, cancer, stroke, diabetes and liver disease. The research findings suggest that the impact of negative childhood experiences on adult health is strong and cumulative. Stressful and traumatic memories may affect the doctor patient communication, relapses with reduction of functionality, side effects of therapies, diagnostic procedures, fear for the future, and future controls. Attachment unresolved issues affect therapeutic alliance with medical teams and reduce compliance to both diagnostic exams and therapies. As a whole, the presence of unresolved traumas affects greatly the prognosis of any disorder. A great deal of research focused on trauma and today the knowledge of its pathophysiology allows new possibilities of treatment, leading to the new field of the neurobiologically based therapies.

In the course will present some of the findings choosing those linked more directly to the clinical process of treatment. Particular emphasis will be paid to the close connection between Brain and Heart, that is between Central and Autonomic Nervous System in affective processing and in relational engagement. Porges' Polivagal Theory is widely used as a functional model of autonomic arousal but its efficacy can be improved integrating it with new models of Central Nervous System processing, offering a great opportunity to personalize both treatment planning and real time management. Richard Davidson, an international renowned neuroscientist, identified six neurobiologically grounded "Emotional Styles", reflecting activity levels in specific and identifiable brain circuits, each affecting the processing of sensorial, emotional and relational inputs and behaviours. Neurobiological Emotional Styles cut across diagnostic categories of mental disorders and Davidson's studies show the possibility to modulate the brain circuits functioning through specific psychological practices. Over the last years we developed a model which integrates the classic conceptualization of cases and treatments with Porges and Davidson's work in order to customize therapies according to individual Central and Autonomic Nervous System Profile.

As an artist can play his best music only if he exploits the features of his musical instrument, so we believe that Neurobiologically Targeted approaches could increase greatly the effectiveness of treatments.