Teaching program for the PHD in Neuroscience

The teaching program will be composed of Basic courses and Advanced courses.
The Basic courses will be mandatory (minimum: 70% of attendance). The students have to choose among the advanced courses (minimum number of hours for advanced courses: 16)

BASIC COURSES:

A) **The teaching scheme includes three areas of competence that the graduate program should provide:**

1. **From anatomy and physiology of the nervous system to cognition**

   a. Neuroanatomy and neuroradiology (10 hours) (Renzo Manara)
   b. Funtional neuroanatomy (4 hours) (Corbetta)
   c. Neuropsychology (Attention and visuo-spatial functions: 2 hours Bonato; Language and calculation: 2 hours: Semenza; Executive functions: 2 hours Vallesi; Memory and emotions: 2 hours Mario Liotti)
   d. Principles of neuronal biophysics, physiology and processing (4 hours) (Vassanelli)
   e. Comparative anatomy and physiology (4 hours) (Megighian)
   f. Laboratory of neuroanatomy (2 hours) (De Caro)
   g. Laboratory of tractography and fibers (4 hours) (Michel De Schotten)

2. **Experimental tools in neuroscience**
   a. The scientific method: practical issues (4 hours) (Vallesi)
   b. Human neuroimaging techniques (16 hours) (Bertoldo)
   c. Graph theory and null models (6 hours) (Suweis) (Right after Bertoldo's course)
   d. Programming on Python (8 hours) (Melucci-Di Buccio)
   e. Methods in psychophysiology (4 hours) (Spironelli-Angrilli)

3. **Statistical and mathematical Tools**
   a. Descriptive statistics in R (Optional and preliminar) (6 hours Girardi)
   b. Basic concepts of statistics (8 hours) (Finos-Girardi) (focused on statistical analysis, multiple comparison correction, data imputation)
   c. Data reduction (PCA, ICA) and/or permutation (6 hours) (Finos-Girardi)

B) **Soft skills and research training***
   a. Presentation skills and public outreach (2 hours) (Cona)
   b. Lesson on how to write scientific papers (1 hour) (Elena Becker Barroso) (To activate?)
   c. Open Science: Toward a change in the scientific paradigm (1 hour) (Massimo Grassi)

*In addition to these lessons, every year, during the PhD Educational week on Transferable skills, the University of Padova offers to PhD students of Padova training activities aimed at strengthening the so-called "*Transferable skills*", i.e. interdisciplinary knowledge in the fields of research design, communication, and relationships with the professional world.
During the 2020-21 academic year the University Language Centre (CLA) will offer a number of **courses of Academic English** for doctoral students at the University of Padova.

ADVANCED COURSES
Each student will choose the modules that finds more useful and interesting for her/his research training to complete the required number of hours (minimum: 16 hours).
The classification in curricula is only meant to better cluster methodological skills and knowledge. We strongly encourage the students to broaden their horizon to the different aspects of Neurosciences.

1. Programming and Computational Neuroscience
   a. Controllability (4 hours) (Suweis)
   b. Basic introduction to Bayesian reasoning (4 hours) (Zanzotto)
   c. Programming in Python – Advanced (10 hours - Di Buccio)

2.Cognitive and Behavioral Neuroscience
   a. Practical course for EEG recording and analysis (8 hours) (Ambrosini)
   b. Practical course for transcranial magnetic and electric stimulation techniques (4 hours) (Cona)
   c. Systematic review meta-analysis and study quality in neuroimaging (8 hours) (Gentili)

3.Cellular and Molecular Neuroscience
   a. Light-based methods for brain circuit analysis (8 hours) (Dal Maschio, Bortolozzi)
   b. Invertebrate nervous system: a way to study higher brain function and their evolution in a simpler (not so simple) nervous system. (4 hours) (Megighian, Cellini; Zordan)
   c. Inhibitory interneurons in the neocortex: from cellular properties to circuits (4 hours) (Pietrobon)
   d. Cellular and synaptic mechanisms of neuronal plasticity (8 Hours, Matteo Caleo)

4.Translational and Clinical Neuroscience
   a. Parkinson's and other movement disorders (4 hours) (Antonini)
   b. Motor recovery and neuroplasticity after central nervous system injury (4 hours) (Del Felice)
   c. Neurodegenerative disorders (4 hours) (Cagnin)
   d. Multiple sclerosis (2 hours) (Gallo)
   e. Brain-body interactions in psychopathology and the bio-neurofeedback (6 hours) (Palomba; Messerotti)

The second part of the scheme includes advanced short classes of 2-8 hours, among which the student will choose some. These courses will be focused on the individual research subject of the proposing faculty and have been clustered on the different platforms of the PNC. The courses are conceived to provide, in addition to the theoretical background, the skill to use the concepts/tools in the research project of the students but should also be considered as an opportunity explore areas that are not directly related to the student background or research project.

Brainhack Diversity. Inter-individual variability in cognitive and clinical neuroscience: signal or noise?
Attendance to this conference/workshop.
https://pnc.unipd.it/brainhack2020/

JOURNAL CLUBS and INTERIM EVALUATIONS
A journal club for all students and faculties will be organized by students themselves (on a volunteering basis) once/twice per month. Each student will have to present and critically comment at least one study each year.

In May-June, the journal clubs will be substituted by progress reports in which each student will have to present her/his project to the other PhD students and to the faculty, and will be evaluated by 3 professors in order to pass to next year or present again her/his work in September-October of the same year (for first year students, the detailed PhD project is expected to be ready and some preliminary data to demonstrate feasibility will be appreciated).

The students will also required to present their project outcomes to the faculty of the Program before the end of each year.