Courses Taught by Dr Horowitz-Kraus

Topics:
- Neuroimaging data analysis
- Functional MRI, networks, connectivity, machine and deep learning
- EEG, ERPs, coherence
- Developmental Cognitive Neuroscience
- Learning difficulties
- Dyslexia, ADHD, Dyscalculia, Autism
- Child's development
- Scientific writing

Winter:

Developmental Cognitive Neuroscience (Winter, 218005, 2 credit points).
The age of children in the education system ranges from 6 to 18 years. Within these years, a dramatic shift from childhood to adolescence and adulthood occurs. This shift is accompanied with neurophysiological, physiological, cognitive, emotional and social changes, directly affect learning and communication skills. This course is an overview of the Cognitive, Emotional and Social changes along development (in children and adolescence) and the neurobiological markers underlie these changes. We will also discuss the nature-nurture relations and the effect on neurocognitive development. The cognitive changes include language cognitive and academic development, whereas the emotional changes include motivation and risk taking which heavily characterize teenagers. Social development and its neural markers will also be discussed. Students will present neuroimaging-based papers aiming to test these abilities.

Learning and Behavioral Differences (Winter, **216003, 2 credit points)**
This course overviews the basic cognitive abilities underlie learning (i.e. language and reading development, executive functions, etc) and overview the impairments in these abilities which eventually lead to learning difficulties. The course overviews the characteristics of different learning and learning-related difficulties (such as Dyslexia, Dyscalculia, Specific language impairments, Attention disorders, Autism and more) as well as the neurobiological characteristics of these disorders. An overview of the structure and interpretation of the diagnosis process as well as interventions for these difficulties will be done.

Lab project in Neuroscience (Winter, 216007, 5 credit points). In this course the student will be focused on a research question, and will have the opportunity to be an integral part of the Educational Neuroimaging Center (ENIC) team. The student will be supervised by one of the Center's members and will be incharge of a specific research question, per interest. The project will be focused on child's brain development and will include a hands-on data collection (if applicable), data analysis (using neurocognitive

EEG, eye tracking, fMRI or MRI datasets), scientific writing and presentations. The student will present the results of the scientific work to the ENIC members throughout the semester. Acceptance to this project depends upon Dr Horowitz-Kraus' confirmation. Please contact Dr Horowitz-Kraus if interested (Tzipi.Kraus@technion.ac.il)

Spring:

Neuroimaging- Theory and Practice (Spring, 218004, 2,5, credit points).
This course links neuronal characteristics and activity to brain activation and connectivity. We discuss a variety of cognitive abilities and their corresponding anatomical loci as well as functional networks. Neuroimaging methods will be discussed (MRI and functional MRI, EEG, fNIRS and MEG) with a special emphasis on MRI and especially functional MRI. Practically we will learn how to conduct an fMRI task, how to analyze the data (including pre and post processing steps) and how to interpret the results.

MRI course for Biomedical Engineering (Spring, has not being assigned yet).
The course overviews the principles of Magnetic Resonance Imaging (signal and sequences), neuroimaging processes and the use in medical research. A specific emphasis on functional MRI and signal processing of BOLD response as well as its interpretation will be made. We will relate the results to neurocognitive processes

An introduction to Education (part 2) (Spring, 214118, 4 credit points)
This course focuses on the learner an on the learning environment. The course overviews the characteristics (cognitive, emotional abilities and needs) of impaired and typical learning and the instructional methods for different types of learners in traditional and computerized environments.

Lab project in Neuroscience (Spring, 216007, 5 credit points). In this course the student will be focused on a research question, and will have the opportunity to be an integral part of the Educational Neuroimaging Center (ENIC) team. The student will be supervised by one of the Center's members and will be in charge of a specific research question, per interest. The project will be focused on child's brain development and will include a hands-on data collection (if applicable), data analysis (using neurocognitive EEG, eye tracking, fMRI or MRI datasets), scientific writing and presentations. The student will present the results of the scientific work to the ENIC members throughout the semester. Acceptance to this project depends upon Dr Horowitz-Kraus' confirmation. Please contact Dr Horowitz-Kraus if interested (Tzipi.Kraus@technion.ac.il)

Scientific programs planning (Spring, 218148, 5 credit points)
In this course the students will work on a real-dataset related to Child brain development and will practice data analysis and mainly scientific writing. The course

overviews and practices the components of a scientific paper. Final outcome is a scientific paper written by the student as well as an academic poster.