DEPARTMENT OF CLINICAL NEUROSCIENCE

K8F5697, Network Neuroscience, 1.5 credits (hec)

Nätverksneurovetenskap, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus is approved by the The Committee for Doctoral Education on 2023-12-27, and is valid from Spring semester 2024.

Responsible department

Department of Clinical Neuroscience, Faculty of Medicine

Prerequisite courses, or equivalent

Basic knowledge of brain imaging

Purpose & Intended learning outcomes

Purpose

The purpose of this course is to provide students with the foundations of network theory. This course will cover all aspects of creating network models from neuroimaging data (theory, assumptions, visualization, and quantifying models).

Intended learning outcomes

After the course, the doctoral student shall have obtained a thorough knowledge about core concepts about network neuroscience. This includes to be able to: 1) create network models; 2) apply and interpret network measures calculated from models (centrality measures, shortest paths, community detection etc); 3) implement a network analysis and visualize the results; 4) show understanding about how network models have been applied within the neurosciences; 5) show understanding about how network models relate to theory; 6) apply recent developments within network neuroscience including multilayer connectivity and deep learning analyses of brain networks

Course content

The basics of network models, measures to quantify networks, history of network science and applications of network models in neuroscience, exercises in how to construct network models in the second version of our software BRAPH (Brain Analysis using Graph Theory; http://braph.org/) and recent developments in network neuroscience. Each student will also do an individual research project applying elements from the course onto data, which can be provided by the organizers or by the student's own PhD projects.

Forms of teaching and learning

Lectures, seminars, demonstrations, laboratory exercises, individual mini research project, oral presentation, short written report.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

Mandatory attendance to lectures and presentation. Absence during lectures will require completing supplementary written tasks.

Forms of assessment

Individual mini research project. This can be carried out on the student's own data or open data provided. The analysis should be presented in a 10 minute presentation. The students are also required to submit a short written report on their project.

Course literature

Selected original research and review papers will be distributed well in advance of the course.