

BIOENG-448

Fundamentals of neuroengineering

Cursus	Sem.	Type
Bioengineering	MA2, MA4	Opt.
Computational Neurosciences minor	E	Opt.
Electrical and Electronical Engineering	MA2, MA4	Opt.
Life Sciences Engineering	MA2, MA4	Opt.
Neuroprosthetics minor	E	Opt.
Neuroscience		Obl.
Robotics	MA2, MA4	Opt.
Sciences du vivant	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Remark

pas donné en 2019-20

Summary

Neuroengineering is at the frontier between neuroscience and engineering: understanding how the brain works allows developing engineering applications and therapies of high impact, while design of new measurement and data analysis techniques contributes to advance our knowledge about the brain.

Content

1. How the Brain Works
2. Recording and Analysis of Brain Activity
3. Peripheral Neuroprostheses
4. Brain-Machine Interfaces
5. Sensory Neuroprostheses
6. Plasticity
7. Neurorehabilitation

Learning Prerequisites**Recommended courses**

Background in neuroscience, signal processing, and machine learning (e.g., EE-516).

Learning Outcomes

By the end of the course, the student must be able to:

- Formalize basic building blocks of neuroengineering.
- Develop critical thinking
- Assess / Evaluate the potential and current limitations of neuroengineering

Teaching methods

Lectures, exercises.

Expected student activities

Students will have to carry out weekly exercises (mostly critical review of papers) and provide a written report.

Assessment methods

Written exam. Final grade: 60% Exam, 40% Exercises.

Resources

Moodle Link

- <http://moodle.epfl.ch/enrol/index.php?id=12691>