BIOENG-490 **Project in computational neurosciences**

Profs divers *

Cursus	Sem.	Type
Computational Neurosciences minor	E, H	Opt.

Language of teaching	English
Credits	8
Withdrawal	Unauthorized
Session	Winter, Summer
Semester	Fall
Exam	During the semester
Workload	240h
Weeks	14
Hours	**8 weekly**
Project	8 weekly
Number of positions	

It is not allowed to withdraw from this subject after the registration deadline.

Summary

The student will engage in a laboratory-based project in the field of computational neuroscience in one of the research labs of the EPFL working in this field.

Content

A typical project will involve a theoretical or computationally-oriented project in the field of neuroscience. The projects are available on the web sites of SV laboratories or discussed directly with a potential head of lab.
The students are confronted with the realization of a research project integrating specific aspects of neuroscience, computation, and mathematical theorz. This project will allow them to apply, to concrete problems, skills of computational neuroscience as well as transversal skills acquired during their studies.

Learning Prerequisites

Required courses

- Bachelor in Life Science, Physics, Engineering, or Computer Science.
- Good knowledge of Mathematics and Computational Principles
- One core master course in the field of computational neuroscience finished before the start of the project (e.g., Unsupervised and Reinforcement Learning, Statistical Neuroscience, Biological Modeling of Neural Networks, In silico neuroscience, Computational Motor Control)

Learning Outcomes

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

- Manage an individual research project
- Develop expertise in a specific area of computational neuroscience
- Implement â#¢ Implement appropriate mathematical or computational methods to address a specific neuroscience problem
- Conduct simulations appropriate to study the problem
- Assess / Evaluate data obtained computational experiments
- Interpret data obtained computational experiments

- Optimize simulation protocols and data presentation
- Derive mathematical predictions from theoretical models

Transversal skills

- Use a work methodology appropriate to the task.
- Assess progress against the plan, and adapt the plan as appropriate.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Keep appropriate documentation for group meetings.
- Demonstrate the capacity for critical thinking
- Demonstrate a capacity for creativity.
- Write a scientific or technical report.

Expected student activities

Students will focus on hands-on computational and mathematical approaches depending on the project. Students will read and discuss assigned papers from the original scientific literature. As part of the evaluation process, students are required to submit a written report and give an oral presentation that summarizes and interprets their results.

Assessment methods

Continuous control
Written report
Oral presentation

Supervision

Others	Typically, the student will be matched with a secondary mentor (this will usually be a senior PhD student or a Postdoctoral Fellow) who will take responsibility for the day-to-day supervision and training of the student.

Resources

Bibliography

Appropriate reading materials will be assigned by the student's mentor depending on the nature of the research project. The assigned reading material will usually comprise original research papers, review articles, and secondary sources (e.g., books).

Websites

- http://sv.epfl.ch/brain-mind