Digital Neuroscience

Degree conferred
Specialised Master of Science in Digital Neuroscience

Languages of study
Study in English

Commencement of studies
Commencement of studies only in the Autumn Semester (September)

Special features for admission
Students, who fulfil the admission requirements of the University of Fribourg, will be further selected on the basis of an individual interview and their curriculum dossier, specifically with respect to previously taken courses in computer programming (C/C++, Matlab, Python, R etc.).

Access to further studies
This master programme qualifies students for the doctoral programmes **Computer Science**, **Bioinformatics**, **Medical Sciences** and **Psychology**

The specialised master programme in Digital Neuroscience provides unique opportunities for an intense learning experience in the area of neuroscience and digitisation. It emphasises practical experience, proficiency and confidence in a curated selection of topics in modern neuroscience, complemented by advanced skills in programming data analytics. Graduates can develop novel applications, methods and solutions in their future employment and/or research careers.

Profile of the study programme

Research is changing. Digitalisation and Machine Learning/AI brought a new wave of progress on Neuroscience problems that seemed insurmountable just a decade ago. We are closer every day to fully understanding how the nervous system works and how to better care for it, while developing increasingly sophisticated interfaces between human and machine. Accessing this new state of the art however places unique requirements on the next generations of neuroscientists, as they need to autonomously understand, employ and even develop advanced computing and mathematical models.

Today, neuroscientists and data analysts typically work side-by-side, but their extensive backgrounds and even terminologies have little to no intersection, which can lead to misunderstandings and sub-optimal processes. Only an expert in both fields can provide a full perspective on the whole process, bringing digitalisation expertise in the experiment design and data collection, but also a neuroscientific awareness and competence in the interpretation of the data and in setting up the most appropriate modelling applications. Such a professional figure however is rarely found in today's market, as most Neuroscience programmes have limited availability of machine learning and data science courses, while Computer Scientists are rarely trained in medical applications and have little to no hands-on laboratory experience.

The University of Fribourg acknowledges this new evolution of the field with the new specialised master programme in Digital Neuroscience, which bridges the neuroscience and digital sides by using a fully interdisciplinary approach. Students receive an uncompromising training in Neuroscience, with courses issued by the Department of Neurosciences and Movement Science (NMS) and Department of Psychology, complemented by theoretical understanding and practical expertise in Machine Learning and Data Analytics as taught directly by the Department of Informatics. Our students become autonomous on both the medical and computational sides of the research process, making them highly valuable on the job market, and setting them up to tackle the most complex challenges of the field.

What will I learn?
The classes offered in this programme fall mainly in either domain of digitalisation or neuroscience. The first semester is designed to provide the fundamentals of both fields with limited assumptions on the students' backgrounds. This includes learning Python programming and data analytics, while understanding the key topics and challenges in modern neuroscience. From there, the students are ready to access the more advanced courses, which include specialised neuroscience applications and hands-on machine learning and artificial intelligence.

The programme is divided into three Validation Packages: Compulsory and Eligible Units make up for half of the ECTS credits (with a rough split 66%-33%), while the thesis work accounts for the remaining half. This means that: (I) new students are expertly guided in the new fields via the Compulsory Units; (II) students are then expected to customise their studies to their specific inclination by choosing one third of their courses, an informed decision as their competence and awareness of the fields grows; (III) the second half of the work comes from the master's thesis, which can start as early as the second semester, allowing the students to gain invaluable hands-on experience in an established laboratory, and actively contribute to real research efforts.

Who is this programme for?
The programme is addressed to students with an undergraduate degree in Life Sciences, Psychology, Informatics, Physics, Economics, Engineering or a related subject area. The number of available seats is limited. Applicants are evaluated on a per-case basis.

What are we looking for?
We look for people who are passionate on both the domains of Medicine and Digitalisation, and willing to take up the challenge of mastering both. Together with essential academic requirements, your personal statement is your opportunity to illustrate whether your reasons for applying to this programme match what the

programme delivers. Be sure to include for example: why you want to study Digital Neuroscience at the University of Fribourg, what particularly attracts you to this programme compared to others available, how your personal and professional background meets the demands of this rigorous programme, what are your previous experiences in the domains of programming and neuroscience, and how do they relate to the aims of this master programme.

Academic and professional openings
We expect the already high demand of students of Digital Neuroscience in companies and start-ups to still increase over the next 5-10 years, particularly in relation to applications to digital mental and physical health, such as wearable devices and bio-signal processing, and sophisticated man-machine applications, including advanced prosthetics and related fields. Methods for biologically inspired machine learning are also undergoing a resurgence, adding to the value of experts with neuroscience expertise. The master's degree also provides a solid foundation for doctoral studies, where students can capitalise on the breadth of the acquired knowledge and skills, and access academic and management leadership positions within Switzerland and abroad.

Studies organisation

Structure of studies

120 ECTS credits, 4 semesters

Curriculum

http://studies.unifr.ch/go/vBvMa

Comments

The number of places is limited to the formation capacities of the involved departments.

Admission

The admission to the specialised master programme in Digital Neuroscience follows the conditions of admission of the University of Fribourg. Holders of a bachelor's degree in Life Sciences, Psychology, Informatics, Physics, Economics, Engineering, or a related subject area, awarded from a Swiss University can be admitted to the master's degree course. The same applies to holders of a bachelor's degree awarded by a foreign university, provided that the bachelor's degree is recognised and considered equivalent by the University of Fribourg. For details, please, refer to the study plan.

Contact

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