Chemistry and Physics of Soft Materials

Degree conferred
Specialized Master of Science in Chemistry and Physics of Soft Materials

Languages of study
Study in English

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

Access to further studies
This Master programme qualifies students also for the Doctoral programme Medical Sciences

Soft materials are a broad class of materials that includes polymers, colloids, foams, gels, biological tissue and many other forms of matter that have both solid and liquid properties at the same time. Soft materials are ubiquitous in everyday life and are important for many industries. In addition to the traditional materials sector, the medical, pharmaceutical and food industries also depend on soft materials and therefore also require professionals with specific training in this domain.

Soft matter science is an interdisciplinary domain, bridging chemistry, physics, biology and materials science and engineering. Anchored at the Adolphe Merkle Institute, the University of Fribourg’s new programme leading to the Specialised Master of Science in Chemistry and Physics of Soft Materials (MScSoft) is intellectually stimulating and provides a unique basis for excellent employment opportunities.

Profile of the study programme
The Specialised Master of Science in Chemistry and Physics of Soft Materials (MScSoft) targets creative, open-minded and broadly interested talents who would like to build their professional careers on such materials. Normally, students will have already earned a Bachelor’s or Master’s degree in Chemistry, Physics, Materials Science, or a closely related discipline. As the programme is taught in English, adequate knowledge of this language is required.

Motivation
Soft materials are a broad class of materials that includes polymers, colloids, foams, gels, biological tissue and many other forms of matter that have both solid and liquid properties at the same time. Soft Materials are ubiquitous in everyday life and are important for many industries. In addition to the traditional materials sector, the medical, pharmaceutical and food industries also depend on soft materials and therefore also require professionals with specific training in this domain.

Objectives
The aim of the programme leading to the Specialised Master of Science in Chemistry and Physics of Soft Materials (MScSoft) is for students to deepen their knowledge and perfect their skills in the interdisciplinary field of soft materials science and at the same time adopt English as a working language. Unlike other Master programmes in materials science that cover the classical broad palette of materials ranging from metals to ceramics, the MScSoft focuses on the physical, chemical and biological aspects of soft matter, including polymers, colloids, foams, gels, granular materials, liquid crystals and biological materials. Furthermore, basic aspects of the bio-materials interface will be addressed.

This interdisciplinary programme is based on core competences of the Faculty of Science of the University of Fribourg in the domain of soft materials. The programme is anchored at the Adolphe Merkle Institute (AMI), an interdisciplinary center of competence that is internationally recognized for its cutting-edge research and education in the domain of soft nanomaterials. The curriculum is taught by eminent scholars from the AMI and other departments of the Faculty of Science, and draws on the resources of several interdisciplinary networks, most notably the Swiss National Center of Competence in Research Bio-Inspired Materials and the Fribourg Center for Nanomaterials.

Students will develop a fundamental understanding of the synthesis, processing and characterization of soft (nano-)materials, their structure-property relations as well as aspects that are relevant for technological applications in different sectors, including the materials industry, consumer products (food, cosmetics, pharma) and medicine. The coursework is complemented by a substantial amount of laboratory classes, short projects and an interdisciplinary Master’s project, all of which are integrated with the research activities of the Adolphe Merkle Institute and will provide students with meaningful hands-on experiences and exceptional practical skills. The technical training is supplemented by curricular elements that lead towards proficiency in scientific English, address ethical aspects, cover important complementary elements such as innovation and technology transfer and advance students’ soft skills.

The Specialised Master’s programme consists of three semesters of formal lectures, exercise classes, projects, seminars and an interdisciplinary project that lasts around eight months and concludes with the Master’s thesis. The combination of a core curriculum and a substantial number of elective courses, along with the significant practical training, guarantees an interdisciplinary curriculum that also permits students to deepen disciplinary knowledge, and fosters students’ ability to work in teams to solve complex problems.

The different teaching units are as follows:

- Lectures that give a formal introduction to the scientific methods in chemistry, physics and biology and advanced scientific thinking. They help in acquiring basic knowledge and understanding fundamental concepts;
- Exercise classes that complement the lectures and provide essential help in understanding and practical application of a lecture’s content. Students will practice and apply the acquired principles and techniques;
Laboratory work, experimental or theoretical, is the basis of scientific research. It provides a controlled environment for hands-on realisation of measurements or chemical syntheses. It is during this work that students will encounter many of the laboratory procedures and instruments used in research and learn good practices;

- Seminar presentations that are used to expand the students' knowledge in specialised domains less covered by the formal courses as well as to nurture the development of oral presentation skills for scientific results;
- Student projects that are a first step in applying the skills learned in the lectures and exercise classes to real research problems;
- The preparation of the Master's thesis, under the supervision of an experienced researcher, is the actual starting point of scientific research.

The programme is taught in English. All exams and written work (project reports, Master’s thesis etc.) will be in English.

Academic and career openings
The Specialised Master of Science in Chemistry and Physics of Soft Materials (MScSoft) is not only intellectually stimulating, but it also provides a basis for excellent employment opportunities in a wide range of industries as well as the ability to pursue an academic career with a Ph.D. Potential employers include the chemical, pharmaceutical and food industries and companies supplying services to these industries in terms of equipment, measurement and analysis, research and regulation.

Studies organisation

Structure of studies
120 ECTS credits, 4 semesters

Curriculum
http://studies.unifr.ch/go/xZPll (French)
http://studies.unifr.ch/go/z3FE1 (German)

Admission
Master’s degree programmes are built on the knowledge and abilities that were acquired when obtaining a Bachelor’s degree.

Holders of a Bachelor’s degree awarded from a Swiss university can be admitted to a Master’s degree programme within the corresponding discipline (requires the acquisition of minimum 60 ECTS credits at Bachelor level in the corresponding discipline) without any additional requirements. 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.

Holders of a Bachelor’s degree awarded from a Swiss university or 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, can be admitted to a Master’s degree programme within another discipline with prerequisites (must be successfully completed before starting the Master’s degree programme) or additional requirements (can be completed during the Master’s degree programme). According to existing agreements, holders of a Bachelor’s degree awarded from a Swiss university of applied sciences can also be admitted with prerequisites or additional requirements.

The respective conditions of admission for each Master’s degree programme are reserved.

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