Chemistry

Degree conferred
Master of Science in Chemistry

Options
This study programme offers specialisation modules to choose from.

Languages of study
Study in English

Commencement of studies
Commencement of studies in the Autumn Semester (September) or in the Spring Semester (February)

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

Chemistry is a science on how are atoms arranged in molecules, materials and in living organisms, and, even more importantly, how do they rearrange and thus make up for nearly all the processes of every day life. During the first year at Master's level, four modules are chosen from the following: Advanced organic chemistry, Analytical chemistry, Advanced synthetic tools, Advanced inorganic chemistry, Materials, Polymers and Industrial chemistry. Half the study programme is also devoted to laboratory work and acquiring the capacity to synthesize compounds, characterize their properties, and determine the structure of unknown compounds. Depending on the choice of modules, students acquire the command of advanced synthetic, analytic, spectroscopic, theoretical or industrial tools. The final six months consist of a Master's thesis, carried out on creative research in one of the Chemistry Department's research groups.

Profile of the study programme

Motivation
Chemistry is a science on how are atoms arranged in molecules, materials and in living organisms, and, even more importantly, how do they rearrange and thus make up for nearly all the processes of every day life. Being a chemist means having a deep knowledge of the laws governing these processes, but, again perhaps even more importantly, chemistry is a creative craft, whereby a chemist masters the art of finding out the structure of unknown materials and of creating new molecules and materials, which have not yet existed in the universe, and which have useful properties like giving off light when voltage is applied, in the organic light emitting diode (OLED). The achievements of chemistry accompany each of us constantly in a modern society – most people do not even realize it – be it as advanced polymers in train, cars, homes, mobile phones and virtually every object of daily use, be it as medication, be it as a method of supervising the safety of our food and environment. The largest challenges are waiting for the coming generation – for you! The humanity will need processes and materials which will substitute burning fossil fuels to gain energy, drugs to heal hitherto incurable diseases, or to improve the OLEDs to extend their lifetime, make them more energy-efficient and suitable even for large displays or for everyday lighting. By studying chemistry you will become the designers and the creative craftsmen to realize these new materials and processes.

Objectives
Depending on your choice of modules you will acquire the command of advanced synthetic, analytic, spectroscopic, theoretical or industrial tools. During the first year you chose four modules out of the six offered by the Department of Chemistry:

- **Analytical chemistry module**, consisting of Analytical Chemistry (parts A and B), and Analytical Chemistry Seminar;
- **Advanced synthetic tools module**, consisting of Synthesis of Complex Molecules, Organometallic Chemistry, the Chemistry of Unpaired Electrons and a Seminar on Advanced Synthetic Methods;
- **Advanced inorganic chemistry module**, consisting of Supramolecular Chemistry, Electronic Structure of Complexes, Molecular Magnetism, Bioinorganic Chemistry, Seminar in Inorganic Chemistry;
- **Materials module**, consisting of Nanomaterials, Crystallography, Crystal growth and Technology, Solid State Chemistry and a Seminar on Materials;
- **Polymers module**, consisting of Polymer Science I and II.

In addition, an **Industrial chemistry module** may be chosen at the College of Engineering and Architecture of Fribourg EIA-HTA (University of Applied Sciences of Western Switzerland HES-SO).

Each module consists of lectures where you acquire new knowledge and the capacity to design synthetic paths or interpret spectra as an example. There are seminars where you learn to study literature and to communicate about science. And finally, since chemistry is not only knowledge, but, perhaps primarily, the «power to do», you will spend nearly one half of your time in laboratories where you'll acquire the capacity to make (synthesize) desired compounds, characterize their properties, and to determine the structure of unknown compounds. The final six months consist of a Master's thesis, where you will have the opportunity to do «real», creative research. You can choose one of the research groups of the Department of Chemistry for this project. Few students choose an outside academic or industrial institution for the practical work; it is allowed provided the project is approved by the Department and is couched by one of the Department's professors.

Academic and career openings
The studies qualify you for a broad spectrum of employments. More than half of the students chose to pursue a programme towards a Ph.D., often in an English-speaking country. During the 3-4 year Ph.D. programme you'll learn to carry out independent research. The potential employers for both Master's degree holders and Ph.Ds. are the pharmaceutical industry, chemical industry, food industry, companies supplying advanced equipment for chemical analysis and research, cantonal or federal control and regulatory establishments or drug authorization agencies. Some graduates pursue careers further away from the classical chemistry profession, for example in an IT company or a NGO. A highly competitive but very interesting option is to pursue a career of academic research and teaching, where the first step is generally an advanced postdoctoral research work at a prestigious university or national laboratory abroad.

An important career option is that of teaching at a academic upper secondary schools (see «Teacher Education for Secondary Level»).

### Studies organisation

#### Structure of studies

90 ECTS credits, 3 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.

### Alternatives

Also offered as a minor study programme (30 ECTS credits) as part of the Diplôme d’Enseignement pour les Ecoles de Maturité (DEEM)/Lehrdiplom für Maturitätsschulen (LDM).

### Contact

Faculty of Science and Medicine
Department of Chemistry
Prof. Andreas Zumbühl
chem-scimed@unifr.ch
http://studies.unifr.ch/go/en-chemistry

http://studies.unifr.ch/enmaster/sci/chemistry