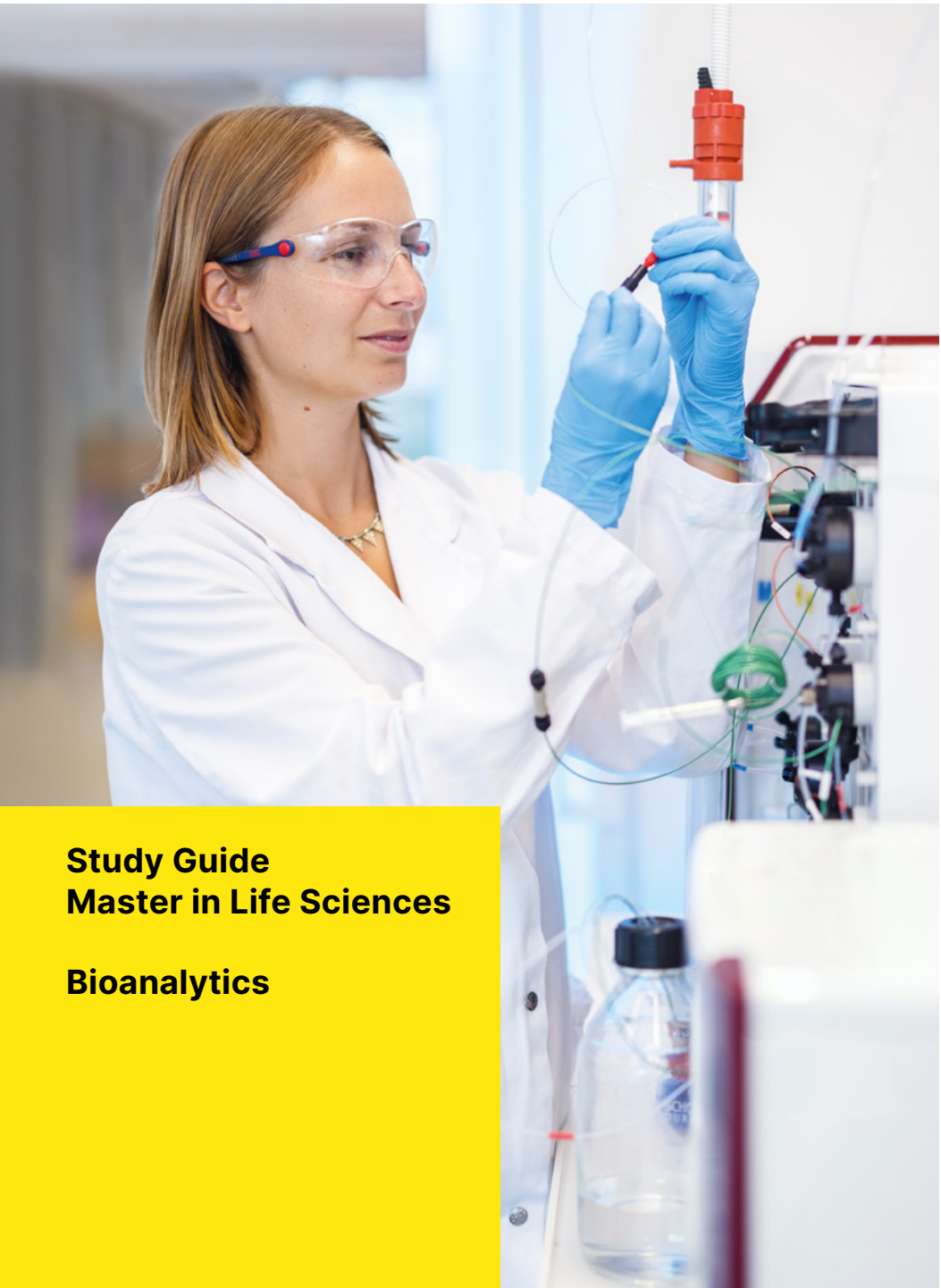
University of Applied Sciences and Arts Northwestern Switzerland
School of Life Sciences



Study Guide
Master in Life Sciences

Bioanalytics

Cover Picture:
Daniela prepares the chromatography column
for purification of a recombinant protein.

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Quick Facts
Master of Science in Life Sciences FHNW

- √ **A coordinated Master's programme in Life Sciences conducted by the Swiss Universities of Applied Sciences**
- √ **Designed for motivated students interested in applied research**
- √ **Opens the door to outstanding career opportunities in research, development and production**
- √ **Specialisations offered by the University of Applied Sciences and Arts Northwestern Switzerland:**
  - Analytical Chemistry
  - Applied Cell Biology
  - Bioanalytics
  - Biotechnology
  - Chemical Engineering
  - Data Science
  - Environmental Technologies
  - Organic and Supramolecular Chemistry
  - Pharmatechnology
- √ **Three semesters full-time study, 90 ECTS credits; part-time study possible**
- √ **Master's thesis: 40 ECTS credits, modules: 50 ECTS credits**
- √ **Admission: good BSc degree in a relevant subject**
- √ **Admission deadlines: April 30th (autumn semester) and November 30th (spring semester)**
- √ **Start of studies: mid-September and mid-February**
- √ **Tuition fees: CHF 750 per semester (Switzerland), CHF 1000 (EU/EFTA), otherwise CHF 5000; CHF 100 per semester for materials and licences**



At the Heart of Life Sciences

Education Meets Industry Needs

The FHNW School of Life Sciences (HLS) is a leading Swiss school for education and application-oriented research in life sciences. With a network of industry and research partners, the HLS is a unique university centred around technology development in medical, natural, environmental and engineering sciences. The state-of-the-art infrastructure facilitates translating cutting-edge research into practice. Benefits for patients, innovative products, intelligent solutions and environmentally friendly technologies are the ultimate goal.

The Master's study programme combines lectures on applied life sciences with practical experience in an eight month Master's thesis. The core of the life sciences study programme consists of scientific knowledge for research and development, coupled with practical experience. Students may assemble their own curriculum from available modules. In order to prepare optimally for a professional career, the course also covers essential management skills. Graduates are ultimately expected to prove their abilities in a competitive and international life sciences environment.

Global Hub for Life Sciences

The FHNW School of Life Sciences in Muttenz (Canton Basel-Land) is situated in one of the global centres of the life sciences industry. Several international companies have their headquarters in the Basel area, e.g. Roche, Novartis, Clariant, Straumann and Syngenta, to name just a few. Apart from these, around 600 other companies in the life sciences sector conduct development, research or production in the Basel area. Together they offer approximately 33 000 high-powered jobs.

The lecturers at the FHNW School of Life Sciences work closely with both local and international industry on joint projects. **In fact, the majority of Bachelor's and Master's theses are completed in collaboration with industry partners.** Located where Switzerland, France, and Germany meet, the Basel area is a vibrant hub of innovation, culture, and opportunity. Set along the scenic Rhine River, it offers not only excellent career prospects but also an exceptional quality of life, with countless options for entertainment, outdoor activities, and cross-border exploration.

Career Prospects

The MSc study programme equips graduates with specialist knowledge that enables them to integrate quickly and effectively into the global life sciences industry and related fields. Graduates receive broad academic training and develop extensive knowledge, complemented by in-depth practical experience.

During the eight-month Master's thesis, students demonstrate their ability to work independently on demanding projects. These qualifications prepare graduates to plan and execute projects in applied research, development, translational research, and production. In addition, they are aware of entrepreneurial considerations such as budgeting, personnel, timelines, markets, and products.

Graduates are able to present and explain the results of their work in their native language and in English to experts and to colleagues from diverse backgrounds. They bring advanced skills and knowledge to multi-disciplinary and interdisciplinary teams.

Where Our Graduates Work

MSc graduates typically take on roles in organisations where they manage or contribute to projects that leverage their expertise. Such organisations operate in a variety of sectors, including chemistry, biotechnology, environmental protection, nutrition, pharmaceuticals, and medical technology.

The Master of Science degree is internationally recognised and qualifies graduates to pursue doctoral studies (PhD) in most countries.

Where Life Sciences Come Alive

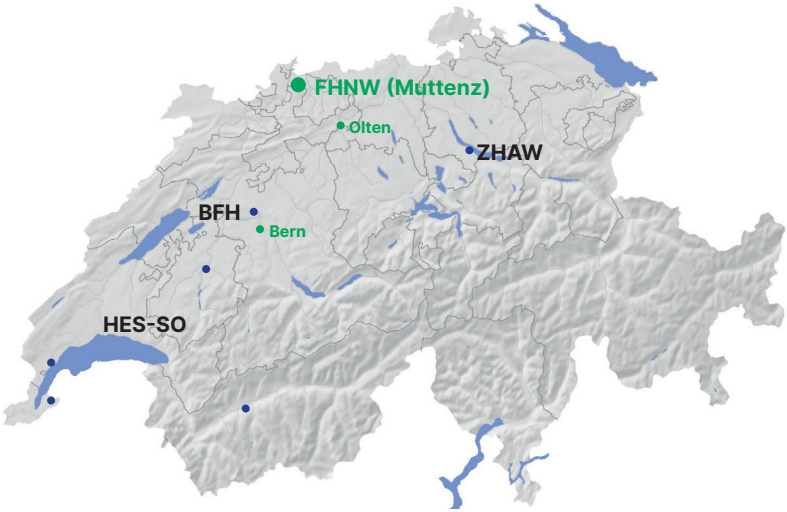
The international Master of Science in Life Sciences is conducted in collaboration with other Swiss Universities of Applied Sciences:

- Berner Fachhochschule BFH
- Haute Ecole Spécialisée de la Suisse Occidentale HES-SO
- Zürcher Hochschule für angewandte Wissenschaften ZHAW

Programme Structure

The MSc study programme encompasses lectures (50 ECTS credits) and the thesis (40 ECTS credits). The specialisation modules are offered by the FHNW School of Life Sciences and take place in Muttenz. The core competence modules and the cluster-specific modules, which are organised in cooperation with the partner universities, are held in Olten and Bern and are offered partly online.

Each module is typically offered at least once per year. The programme concludes with a Master's thesis completed during the final semester.



Study Consultation
After acceptance into the programme, the Programme Head will meet individually with each student to plan which modules should be taken in which semester. This ensures that every student follows a personalised study plan tailored to their academic interests and professional goals. It is also possible to complete part of the programme at a partner institution abroad.

Teaching Language
The programme is taught in English. This requires that in addition to the technical and scientific skills applicants must be able to read scientific articles and books, follow the lectures, participate in discussions and be able to write the thesis in English on their own. Therefore, it must be emphasised that students who want to undertake the MSc programme need adequate skills in English (see page 20).

Educational Concept
The educational concept of "blended learning" combines independent learning with lessons on site. When preparing course contents, modern forms of teaching and learning such as e-learning and case studies are included. In seminars and workshops, students deal with challenging issues and differing points of view. Complex issues will be explained by the instructors in lessons. In the Master's programme, great emphasis is put on "research learning", where traditional teaching is augmented by individual context-based knowledge generation.

Start
The programme begins either in the autumn semester (calendar week 38) or the spring semester (calendar week 8).

Completion
Successful completion of the programme leads to the award of the title "Master of Science", an internationally recognised degree.

Learn More
The FHNW School of Life Sciences offers information evenings that provide more details about the MSc study programme. Please check the website for more information and dates.

Structure of the Study Programme

Full-Time Students

The MSc study programme comprises 90 ECTS credits. Shown here is a full-time study plan starting in the autumn semester (1.5 years):

Study Plan

Autumn Semester		Spring Semester			
Sep	**Feb**	**Feb**	**Jun**	**Jun**	**Sep**
Lectures (1st sem.)		**Lectures** (2nd sem.)		**Thesis** (8 months)	
Thesis (3rd sem., 8 months)					

Programme Structure Full-Time Students

Master's Thesis 8 months from end of 2nd to 3rd semester — 40 ECTS credits

Modules — min. 50 ECTS credits

Core Competence Modules

4–8 modules of 3 ECTS
are taken during the first two semesters
(for details see pages 14–17)

Specialist Modules

9–13 modules of 3 ECTS
are taken during the first two semesters
(for details refer to module groups pages 12–15)

Note: It is possible that modules or final exams take place outside the semester.

Part-Time Students

Part-time study is an option and typically takes approximately six semesters. Students may work alongside their studies; as a guideline, a workload of 50 to 60 percent is considered appropriate.
Shown here is a part-time study plan starting in the autumn semester (3 years, alternative study plans are possible):

Study Plan

Autumn Semester		Spring Semester			
Sep	**Feb**	**Feb**	**Jun**	**Jun**	**Sep**
Lectures (1st sem.)		**Lectures** (2nd sem.)			
Lectures (3rd sem.)		**Lectures** (4th sem.)		**Thesis** (8 or 12 months)	
Thesis (5/6th sem., 8 or 12 months)					

Programme Structure Part-Time Students

Master's Thesis 8 months from end of 4th to 5th semester or 12 months from end of 4th to 6th semester — 40 ECTS credits

Modules — min. 50 ECTS credits

Core Competence Modules

4–8 modules of 3 ECTS
are taken during the first four semesters
(for details see pages 14–17)

Specialist Modules

9–13 modules of 3 ECTS
are taken during the first four semesters
(for details refer to module groups pages 12–15)

Note: It is possible that modules or final exams take place outside the semester.

Specialisation Bioanalytics

The specialisation in bioanalytics provides an excellent preparation for working in an industrial, academic or medical environment. The analysis of biomolecules such as drugs, metabolites, proteins, nucleic acids, microorganisms, etc. is gaining world-wide importance. Bioanalytics is central for product quality control and is fundamental to research and development of new products in the pharmaceutical, food and medical fields. The demand for specialists in bioanalytics is also increasing thanks to technical advances which are opening up new analytical possibilities and strategies, e.g. in precision medicine.

The modules offered focus on the analysis, detection and identification of biomarkers such as small molecules, proteins, nucleic acids, and combinations thereof. The modules include cutting edge technologies e.g., in the fields of proteomics, genomics, molecular biology, microbiology and in vitro diagnostics.

Further modules can be chosen from neighbouring specialisations, in particular Analytical Chemistry, Applied Cell Biology, Biotechnology, Data Science and Pharmatechnology. The broad range of specialist and generic modules allows each student to create an individually tailored study programme (see pages 12–15).

Students may also study an extra semester at a foreign partner university, allowing them to gain an additional degree (page 19).

The MSc includes an eight month thesis, usually conducted at the research, development or manufacturing facility of one of our industrial partners, or internally at the FHNW. Alternatively, the thesis can be carried out abroad at any institution (private or public) that meets the FHNW's scientific standards. The thesis forms the basis for successful employment in industry or in academia.

The combination of two semesters of study with practical experience gained during the thesis qualify our alumni for stimulating and demanding positions in research and development or for doctoral studies.

The MSc in Life Sciences – Bioanalytics is especially suited for students with a BSc degree in Biochemistry, Chemistry, Biotechnology, Biology or related fields. For admission please see page 20.

Further Specialisations offered in the MSc in Life Sciences FHNW

- Analytical Chemistry
- Applied Cell Biology
- Biotechnology
- Chemical Engineering
- Data Science
- Environmental Technologies
- Organic and Supramolecular Chemistry
- Pharmatechnology

Please consult the respective Study Guides for more information.

Module Groups for Bioanalytics

	Type	Semester	Venue
Module Group Bioanalytics (5 out of 7 required)			
Cellular Imaging	S	AS	Muttenz
Chromatography and Mass-Spectrometry	S	AS	Muttenz
Genomics	S	AS	Muttenz
Bioanalytics in a Regulated Environment	CS	AS-B3	Muttenz
Bioassays: Engineered Cells, Tissues and Organisms	S	SS	Muttenz
Biomarker	S	SS	Muttenz
Proteomics and Protein Analytics	S	SS	Muttenz
Module Group Electives (5 out of 10 required)			
Bioorganic and Bioconjugate Chemistry	S	AS	Muttenz
Biostructures and Solid State Sciences	S	AS	Muttenz
Gene- and Cell-Therapeutics	S	AS	Muttenz
Compound Profiling in Pharmaceutical Drug Discovery	CS	AS-2	Olten/online
Advanced Mass Spectrometry	S	SS	Muttenz
Environmental Risk Assessment	S	SS	Muttenz
Formulation of Biologics and Routes of Drug Delivery	S	SS	Muttenz
Molecular and Translational Imaging	S	SS	Muttenz
Process Analytical Techniques	S	SS	Muttenz
Physiology and Immunotherapies	CS	SS-1	Bern/online

N.B. In total 50 ECTS (meaning 17 modules à 3 ECTS) have to be gained.
Complete Module Offer: www.fhnw.ch/hls/master-ls-module
Webtool to plan your studies: https://planyourstudies.lifesciences.fhnw.ch/

	Physics of imaging, molecular imaging, confocal imaging, super-resolution imaging, live imaging, alternatives to light microscopy, applications
	Fundamentals on chromatographic separations and mass spectrometry, applications of bioanalytical mass spectrometry, case studies
	Next generation sequencing technologies, genomics in a clinical context, liquid biopsy, practical excercise, student workshop: genome engineering
	Concept of specification, development phases of a test methods, monographs for biopharmaceuticals, GMP requirements, analytical SOP
	In vitro methods, cell-based assays, genome engineering and basic concepts of high throughput screening, mammalian and non-mammalian in vivo methods for efficacy and toxicity testing
	Type of biomarkers, design of study to identify biomarkers, traditional and novel types of biomarkers, student group work on biomaker identification
	Protein identification by mass spectroscopy, quantification, posttranslational modifications, light-scattering, infrared spectroscopy, calorimetry, turbidimetry, CD spectroscopy

	Reactivity of biomacromolecules, bioconjugation, biorthogonal chemistry, biocatalytic bioconjugation
	Crystallography, powder X-ray, protein structure determination, cryo electron microscopy, solid state characterization
	Ex-vivo gene manipulation, viral vectors, stem cells as therapeutics, toxicology, pharmacokinetics and manufacturing of gene- and cell therapeutics, clinical applications
	Target identification, clinical candidate selection, ADME, toxicology assessment, validity of test models, extrapolation from animal and in vitro studies to man
	Technological aspects of mass spectrometry, metabolomics, proteomics, trends and applications in mass pectrometry, student presentations
	Environmental sampling, fate of pollutants, excercise on fate, effects and risk assessment, mixtures, risk communication
	Formulation and delivery of biologics (liquid and solid forms), drug delivery, drug targeting
	Current key imaging modalities, positron emission tomography, magnetic resonance imaging, spectroscopic imaging methods
	Process analytical technology in research, development and manufacturing, at-line and online analytics, multivariate data analysis and design of experiments, case studies
	3D-construction of human tissues, co-cultures of blood immune cells and infectious microorganisms, immune-based therapies

S = Specialisation module
CS = Cluster-specific modules
CC = Core Competences

AS = Autumn semester
SS = Spring semester

- 1: first semester half
- 2: 2nd semester half
- Bx: block week after the semester

Module Groups Bioanalytics

Module Group Core Competences (4 out of 8 required)			
Handling and Visualizing Data	CC	AS/SS-1 morning	Lectures: online Coaching: Muttenz
Business Administration for Life Sciences	CC		Lectures: online Coaching: Muttenz
Data and Ethics	CC	AS/SS-1 afternoon	Lectures: online Coaching: Muttenz
Management and Leadership for Life Sciences	CC		Lectures: online Coaching: Muttenz
Design and Analysis of Experiments	CC	AS/SS-2 morning	Lectures: online Coaching: Muttenz
Innovation and Project Management	CC		Lectures: online Coaching: Muttenz
Modelling and Exploration of Multivariate Data	CC	AS/SS-2 afternoon	Lectures: online Coaching: Muttenz
Politics and Society	CC		Lectures: online Coaching: Muttenz

N.B. In total 50 ECTS (meaning 17 modules à 3 ECTS) have to be gained.
Complete Module Offer: www.fhnw.ch/hls/master-ls-module
Webtool to plan your studies: https://planyourstudies.lifesciences.fhnw.ch/

	Introduction to R, organising data, databases, describing data: scatter, skewness, outliers, visualising data, informative plots
	Business models, marketing, production, sourcing, capital budgeting, financial accounting, cost accounting
	Personal data security, information security, encryption, digital signatures, data stewardship, data ethics, privacy
	Management, corporate ethics, strategic management, HR management, leadership, change management
	Statistical interference, experimental design, feasibility, efficiency and power of experiment designs, statistical analysis, interpretation and visualisation of results
	Entrepreneurship, megatrends, innovation management, presentation techniques, project management
	Modelling: linear, nonparametric and multiple regression, model selection and diagnosis; exploration: visual inspection, principal component analysis, clustering
	Politics: a process of negotiation, struggle and compromise; the role of society; public opinion, responsibility, ethics

S = Specialisation module
CS = Cluster-specific modules
CC = Core Competences

AS = Autumn semester
SS = Spring semester
AS/SS = Both semester

- 1: first semester half
- 2: 2nd semester half
- Bx: block week after the semester

Core Competence Modules

The core competence modules are designed to introduce students to the life sciences industry, focusing on professional life within the industry as well as providing insight into data handling and analysis techniques.

Business, Management and Society
This subject area includes three modules – Business Administration, Management and Leadership, and Innovation and Project Management – all designed to provide a solid understanding of how life sciences companies operate, are structured, and are led. A fourth module, Politics and Society, focuses on the broader social, political, and ethical context in which life sciences companies function.

Together, these modules equip students with a well-rounded perspective on both the internal dynamics and external responsibilities of organisations in the life sciences sector. Graduates develop the skills and insight needed to address entrepreneurial challenges and are well prepared for leadership roles in industry.

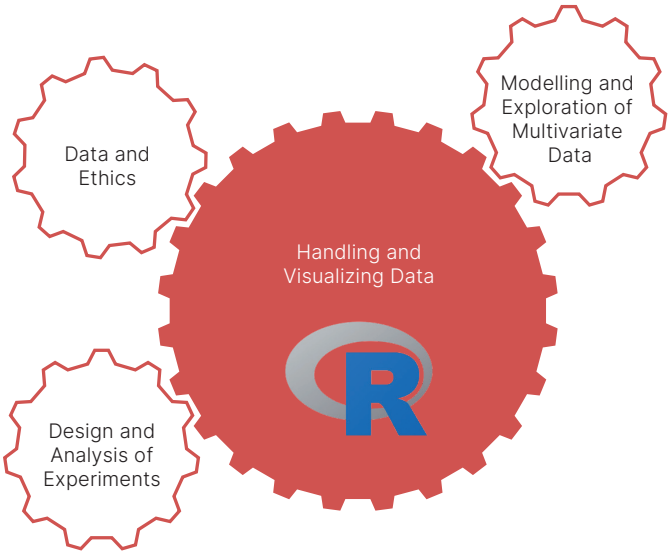


Data

The four data core competence modules include Handling and Visualizing Data, Design and Analysis of Experiments, Modelling and Exploration of Multivariate Data, and Data and Ethics. These modules emphasize the growing importance of information in all technical and scientific fields. As data generation and collection continue to increase rapidly, companies need skilled professionals to analyze and interpret this information effectively.

In three of the modules, students learn to plan and design experiments, manage large datasets, visualize data clearly, and apply advanced analytical methods using "R", a powerful and open software suite for data analysis. The fourth module, Data and Ethics, covers important topics such as data management, privacy, and security.

By completing these modules, students gain the skills necessary to analyze their own data, to prepare high quality figures for meaningful data visualization, and to select, and apply the appropriate methods for data analysis and data management. This prepares them to make valuable contributions in the life sciences industry.



The Master's Thesis

Amounting to 40 ECTS points, the thesis is the most important module of the MSc programme. It addresses a scientific or technical question of practical relevance and is carried out either at an institute of the FHNW School of Life Sciences, at the site of an industrial partner or at a foreign university or research institute. In all cases, the student is supervised by a member of the school's faculty.

The thesis has to be written in English and lasts eight months in full-time study.

Our Partner Schools

Double-Degree with Linköping University
Selected students in our Master's programme can complete a double degree by taking an additional semester at the Linköping University, earning them two titles of MSc in Life Sciences FHNW and MSc in Protein Science from the University of Linköping.

LINKÖPING UNIVERSITY

Double Degree

Double-Degree with UCT Prague
Selected students in our Master's programme can complete a double degree by taking an additional semester at the UCT Prague, earning them the two titles of MSc in Life Sciences FHNW and MSc in Biotechnology and Food Science UCT Prague.

UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

Partner Schools
The FHNW School of Life Sciences has over 20 international partner schools all over the world. Students may spend one semester at a foreign university in selected MSc programmes. In addition, it is possible to do the Master's thesis abroad. The School of Life Sciences is a member of the SEMP (Swiss European Mobility Programme) which supports student exchanges within Europe.

Cooperation with the University of Basel
Students of the MSc programme may visit additional lectures offered by the University of Basel. Please consult the module handbook for details.

Universität Basel

Admission and Enrolment

Terms of Admission
As a rule, outstanding bachelor's degree qualifications are accepted for the MSc programme.

Candidates will be admitted without an entry examination if they have
– gained a BSc in a related subject and graduated with a good grade (Switzerland: A, B or ≥ 5; Germany / Austria: at least "gut")
– the required English skills

Motivated students who do not fulfil the entry requirements entirely might be invited for an assessment interview.

Adequate English competence has to be proven with one of these certificates:

Type of Certificate		Required level
CE	(Cambridge English)	B2 / FCE
IELTS	(English Language Testing System)	5.5
TOEFL	(Test of English as a Foreign Language)	iBT 72
Spoken or Written Academic English	(module of the Bachelor programme at the FHNW School of Life Sciences)	4.5

In the event of a lower English level, the applicants may be admitted but have the obligation to improve their English during the Master's course. They may attend the Advanced English course offered by the School of Life Sciences or may attend other courses. At the end of the studies, students have to prove that they have attained the required English level (see table above).

Application
Deadline for applications is the end of April for the autumn semester (start in calendar week 38) and the end of November for the spring semester (start in calendar week 8). Please apply online via our webportal.

Fees and Grants

Fees and Expenses		
Tuition fees per semester for: • Swiss citizens • Students whose legal residence is in Switzerland at the beginning of their studies • Students who can provide proof that their parents had legal residence in Switzerland at the beginning of the studies • Adult refugees and stateless persons with legal residence in Switzerland	CHF	750
Semester fee for students whose legal residence at the beginning of their studies is in an EU/EFTA country	CHF	1000
Semester fee for students whose legal residence at the beginning of their studies is in neither Switzerland nor an EU/EFTA country	CHF	5000
Materials and licences per semester	CHF	100
Enrolment fee	CHF	200
Graduation fee	CHF	300

Grants

In Switzerland, grants are regulated on a cantonal basis. The canton of your place of residence decides on grants or interest-free loans. In addition to public grants, there are also private institutions that award scholarships.

FHNW University of Applied Sciences and Arts Northwestern Switzerland

The FHNW University of Applied Sciences and Arts Northwestern Switzerland is an education and research institution that enjoys strong regional ties. It has established itself as one of Switzerland's leading and most innovative universities of applied sciences.

The FHNW is composed of ten Schools covering Applied Psychology, Architecture, Construction and Geomatics, Art and Design, Computer Science, Life Sciences, Music, Education, Social Work, Engineering and Environment as well as Business. The FHNW campus occupies a number of sites in its four sponsor cantons, Aargau, Basel-Landschaft, Basel-Stadt and Solothurn.

The FHNW provides education to approximately 14 000 students. Around 1 380 lecturers impart practical and market-oriented knowledge in 34 bachelor's and 23 master's programmes as well as in numerous continuing education courses. The FHNW's graduates are in demand as professionals.

Aside from the education and training offered by the University of Applied Sciences and Arts Northwestern Switzerland, high priority is placed on applied research and development. The FHNW participates in research projects alongside national and international partners from industry, business, culture, administration and institutions, and is involved in European research programmes. The University promotes the transfer of knowledge and technology to industry and institutions. In 2024 its applied research and development activities encompassed 1 348 research projects and 404 service provision projects.


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We are at your service
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The FHNW incorporates ten Schools:

- FHNW School of Applied Psychology
- FHNW School of Architecture, Construction and Geomatics
- FHNW Basel Academy of Art and Design
- FHNW School of Computer Science
- **FHNW School of Life Sciences**
- FHNW Basel Academy of Music
- FHNW School of Education
- FHNW School of Social Work
- FHNW School of Engineering and Environment
- FHNW School of Business

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