

- The FHNW incorporates nine faculties:
- School of Applied Psychology
  - School of Architecture, Civil Engineering and Geomatics
  - Academy of Art and Design
  - School of Business
  - School of Engineering
  - **School of Life Sciences**
  - Academy of Music
  - School of Social Work
  - School of Teacher Education

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**Master of Science in Life Sciences**

- Molecular Technologies
- Therapeutic Technologies
- Environmental Technologies

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## Editorial

- **state of the art technologies**
- **entrepreneurial orientation**
- **scientific knowledge**

### **The School of Life Sciences**

The guiding principle of our school is to provide modern education with an entrepreneurial orientation, driven by state of the art technology research. The core of our life sciences study programmes consists of scientific knowledge for research and development, coupled with practical experience.

The Basel region – as an industrial area – is at the top of global research-focused life sciences rankings, together with the New York and Boston areas. Local life sciences companies cover pharmaceutical, diagnostic and medtech industries and represent excellent value-generation and job market potential in the region. Innovative technologies characterise the life science sector as well as the work of our instructors and staff. Our students work closely with industry partners on many research projects, solving complex problems with an interdisciplinary approach. This process empowers them for successful entry into the contemporary world of employment.

Students assemble their own study programme from the available modules. We support them in their selection and provide assistance in optimal preparation for later career orientations.

Our graduates are ultimately expected to demonstrate their abilities in a competitive and international life science environment. Studies are therefore complemented by English language skills and the option of study abroad at a partner institute.

Professor Gerda Huber, PhD  
Director of School of Life Sciences

# The Master Programme in Life Sciences

The University of Applied Sciences and Arts Northwestern Switzerland, the Bern University of Applied Sciences, the Zurich University of Applied Sciences and the University of Applied Sciences Western Switzerland have each offered a unique course of Master studies in Life Sciences since 2009.

## The Essentials

### **Application orientation – Providing solutions for the world of work!**

Master graduates from universities of applied sciences have concentrated on application-orientated research throughout their studies. Their Master thesis is usually based on concrete questions from the world of work, often in close collaboration with a national or international company or a private or public organisation. This ensures direct relevance to practical issues.

### **Career opportunities – New perspectives for the future!**

Close connections with industry during the study programme and the final assignment are an ideal preparation for entry at specialist or management level. This in turn opens up new career perspectives for graduates.

### **Networking – Cooperation and exchange!**

The modular structure and cooperation with other universities of applied sciences are designed to support graduates in their professional and personal networking activities.

### **Teaching and learning – Research-based learning!**

The Master thesis, based on independent research, is the central focus of the study programme. Furthermore, individually selected modules develop the generic, interdisciplinary competences demanded by the market. Individual supervision by motivated lecturers ensures that Master students receive the benefit of a personalised programme.

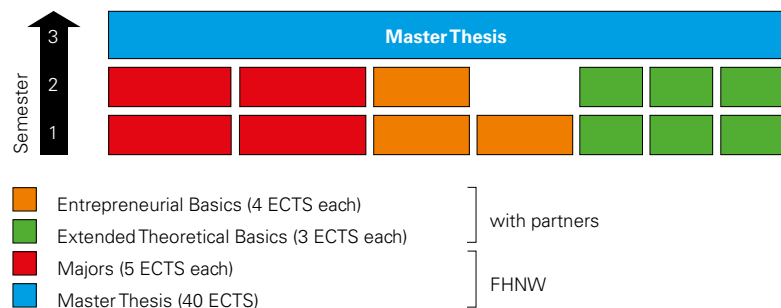


## Curriculum

The study programme encompasses the Master thesis and three types of modules:

- Thesis (40 ECTS)
- Modules (20 ECTS) in the majors Molecular Technologies, Therapeutic Technologies and Environmental Technologies
- Extended Theoretical Basics modules (18 ECTS)
- Entrepreneurial Basics modules (12 ECTS)

The major modules are offered by the School of Life Sciences and take place in Basel or Muttenz. The Entrepreneurial Basics and the Extended Theoretical Basics modules, which are organised in cooperation with partner universities of applied sciences, are held in Bern and Spiez. The modules are supported by an innovative e-learning platform.



### Three semesters' full-time study\*

Each student chooses three Entrepreneurial Basics modules (4 ECTS each), six Extended Theoretical Basics modules (3 ECTS each) and four major-specific modules (5 ECTS each). The Basics modules are jointly organised by the Swiss Universities of Applied Sciences. The modules are offered once a year. Therefore the number of modules taken in the first and second semesters depends upon the choice of the student.

\* part-time study possible

## Majors

The School of Life Sciences offers three innovative majors within the Master programme.

### Molecular Technologies

#### Synthesis and analysis of active compounds and biological systems

Students enrolled in the **Molecular Technologies** major will become experts in synthetic chemical and analytical issues. Subjects covered range from the analysis and structure elucidation of substances to the design and application of molecular and cellular assays in high-throughput settings. Students will also acquire competences to design and optimize synthetic routes and scale-up organic synthesis using chemical engineering approaches. In addition, courses deal with sustainable production and with environmental protection technologies.

### Therapeutic Technologies

#### Pharmaceutical technologies and medical engineering for disease treatment

The **Therapeutic Technologies** major offers an innovative technical curriculum at the interface of pharmatechnology and biomedical engineering. Students enrolled in this major will learn to design and develop engineering-based solutions to treat diseases and/or to assist patients. Knowledge acquired covers biomaterials/surface characterization, image processing and implant design. Furthermore, students learn about medical systems with emphasis on interactive and tele-medical solutions and about how an active compound is formulated so that it is efficiently and safely delivered to target tissues. In addition students learn how a drug is produced in an industrial setting.

## Environmental Technologies

### Applied environmental science and technology

The Major in **Environmental Technologies** deals with applied technologies and strategies in the areas of water and waste management. This includes the optimization of process, material and energy flows with the aim of minimizing harmful emissions into the environment. The technologies covered are based *inter alia* on biotechnological processes and on membrane technology, for example, in water treatment and environmental remediation. Principles to develop sustainable water use cycles as well as the assessment of treatment effectiveness and efficiency of chemical and biological methods are part of the programme. In the context of environmental protection in industry the concepts of clean technologies (CT) and integrated product policy (IPP) will be studied, including aspects such as eco-efficiency of processes and utilisation of waste streams as secondary resources. The students will also learn to perform technology-related environmental risk assessments and mitigation measure planning.

*The major Environmental Technologies is planned to start in the autumn semester 2012. Permission by the federal authorities is pending. For latest updates please consult our website [www.fhnw.ch/lifesciences](http://www.fhnw.ch/lifesciences).*

## Master Thesis

Amounting to 40 ECTS, the thesis is the most important module of the Master programme. It addresses an important scientific or technical question of practical relevance and is carried out either externally in industry or at one of the institutes of the School of Life Sciences. In both cases the student is supervised closely by a member of the school's faculty. The thesis should take about eight months and is concluded by a viva. The thesis has to be written in English.



# Major Modules Overview

<b>Molecular Technologies</b>
<b>Applied organic chemistry</b> (Organic synthesis; Selected topics in medicinal chemistry; Special methods in NMR spectroscopy)
<b>Chemical engineering</b> (Microprocess technology; Process control and automation; Production of semi-solid materials)
<b>Instrumental analytics</b> (Hyphenated mass spectrometric methods; Advanced spectroscopy and imaging)
<b>Profiling of bioactive compounds</b> (From target to effect: concepts, assays & models; Advanced technologies)
<b>Applied bioanalytics</b> (Advanced pharmacology and toxicology; Radioanalytics; Ecotoxicology; Systems biology)
<b>Therapeutic Technologies</b>
<b>Drug formulation and delivery</b> (Controlled release technologies; Biopharmaceutical modelling and simulation; Oral formulations of poorly water soluble drugs; Alternative routes of drug delivery and drug targeting)
<b>Drug manufacturing</b> (Advanced pharmaceutical plants; System dynamics of production processes; Technical services and process media)
<b>Medical systems</b> (Development of medical devices; Interactive systems; Distributed medical systems)
<b>Implant development</b> (Image processing for surgical planning; Surgical support systems; Medical additive manufacturing)
<b>Environmental Technologies</b>
<b>Water management and treatment technologies</b> (Water resources management; Water purification and supply; Sustainable water use; Wastewater treatment and reuse; Water quality and health)
<b>Materials recovery technologies</b> (Materials and mass flow analysis; Separation and conversion technologies (methods & tools); Management of recovered materials (acceptance; quality; marketing))
<b>Environmental remediation</b> (Management and monitoring of contaminated sites; Physico-chemical remediation technologies; Advanced environmental biotechnologies based on the use of living organisms)
<b>Environmental risk assessment</b> (Exposure assessment; Bioavailability and fate of pollutants; Environmental and health impact of pollutants)
<b>Common modules</b>
<b>Life cycle assessment and regulatory</b> (Life cycle and environmental impact assessment; Environmental regulations; Registration of chemicals; drugs and medical products)
<b>Bio-Nanotechnology</b> ((Bio-)sensors; Surface technology; Advanced (bio-)materials)
<b>Sustainable production and clean technologies</b> (Process integrated preventive environmental protection; Industrial environmental technologies)

<b>Student's Interest</b>					
<b>bioanalytics / diagnostics</b>	<b>analytic chemistry</b>	<b>synthetic chemistry</b>	<b>clean technologies</b>	<b>pharma-technology</b>	<b>medicinal technology</b>
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Students choose four modules (5 ECTS each). Three are from the chosen major but the fourth module can be chosen freely from the modules on offer. The common modules Bio-Nanotechnology, Sustainable production and clean technologies and Life cycle assessment and regulations count for all majors. The table shows combinations which may correspond to a student's specific field of interest.

## Basic Modules

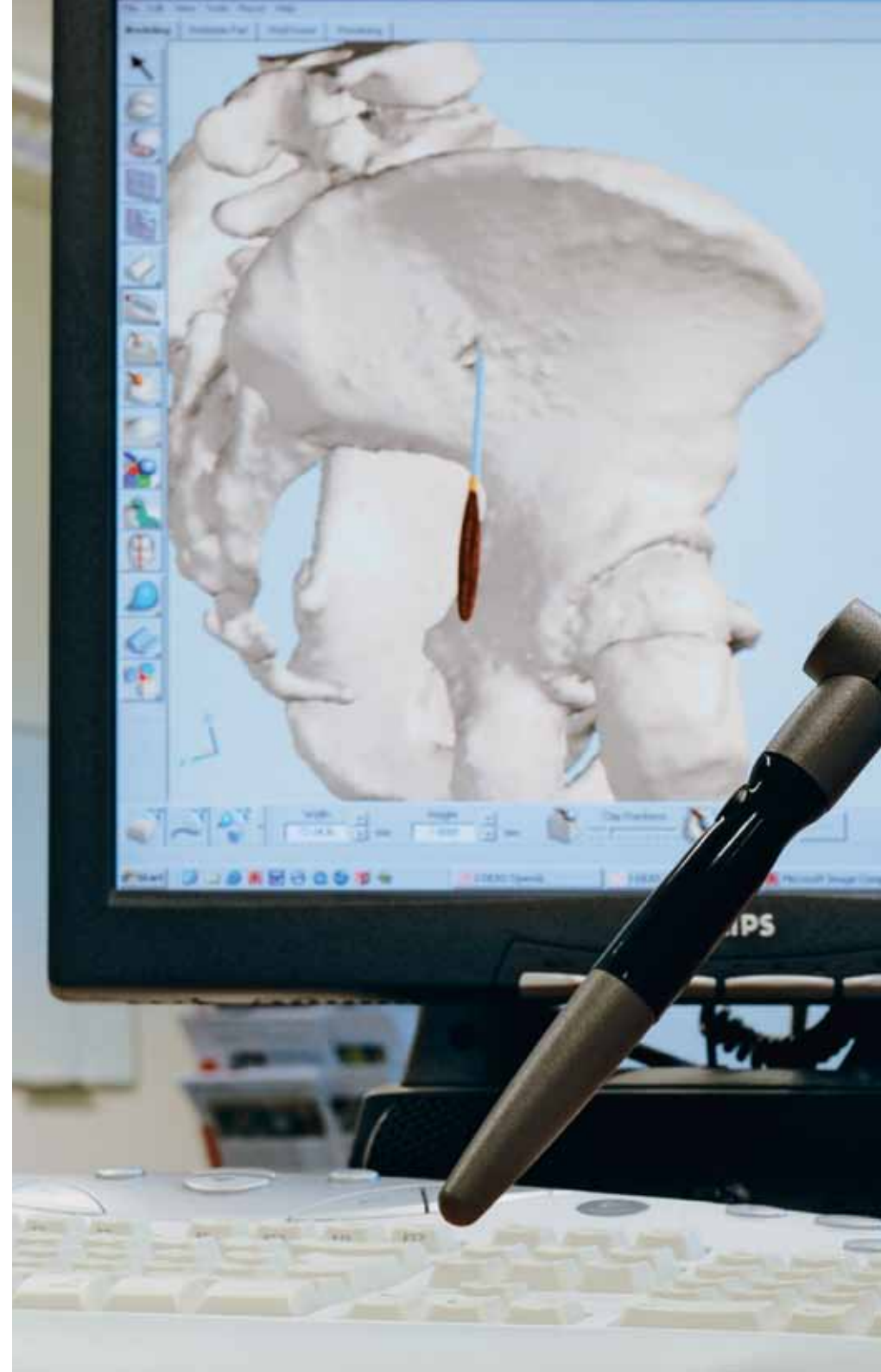
(in cooperation with partner universities)

**The Entrepreneurial Basics** modules teach students to understand and apply interfaces between their technical-scientific core areas and economic and social fields. From the following five modules, worth four ECTS points each, students **select three modules** relating to their area of specialisation and their subject interests:

- Innovation and knowledge management
- Leadership
- Business management
- Communication and market
- Society, legislation and politics

**The Extended Theoretical Basics** support the **subject specialisation** in the Master programme by expanding the scope of knowledge of the Bachelor degree. The catalogue of eleven modules from various in-depth fields of specialisation covers course requirements and meets students' interests. The students **select six modules**, worth three ECTS points each, from the following modules, relating to their field of specialisation:

- Quality excellence
- Health and nutrition
- Applied statistics and mathematics
- Data management and visualisation
- Environmental policy and future models
- Socio-cultural and psychological aspects of sustainable development
- Biodiversity assessment
- Comparative physiology
- Industrial system theory
- Active natural substances and materials
- Fundamentals of nanosciences



# Basic Modules Overview

(in cooperation with partner universities)

Entrepreneurial Basics Modules	ECTS
<b>Innovation and knowledge management</b> Innovation and knowledge management foundations; Intellectual property management; Information acquisition and information collaboration; Scientific problem solving	4
<b>Leadership</b> Personnel management and team building; Context analysis and techniques for discussion/negotiation; Conflict and crisis management; Project management	4
<b>Business management</b> Entrepreneurial thinking and acting; Strategic management; Financial accounting and capital budgeting; Business plan	4
<b>Communication and market</b> Introduction to marketing & marketing research; Marketing strategy; Integrated marketing communication; Markets	4
<b>Society, legislation and politics</b> Political ecology and development policies	4

Scope of studies: 3 modules  
Available: 5 modules worth 4 ECTS points each

Extended Theoretical Basics Modules	ECTS
<b>Quality excellence</b> Current concepts in quality management; Quality performance	3
<b>Health and nutrition</b> Health; Nutrition	3
<b>Applied statistics and mathematics</b> Analysis of variance and experimental design; Regression models and analysis of survey data; Analysis of categorical data, individual focus	3
<b>Data processing and visualisation</b> Database structures and data maintenance; Analysis of low – and high – dimensional data; Data visualisation	3
<b>Environmental policy and future models</b> Environmental policy and governance: from local community level to international organisations	3
<b>Socio-cultural and psychological aspects of sustainable development</b> Sociocultural and psychological aspects of sustainable development	3
<b>Biodiversity assessment</b> Biodiversity	3
<b>Comparative physiology</b> Human physiology; Cell physiology and therapy; Microorganism physiology	3
<b>Industrial system theory</b> Simulation and parameter identification; Modelling of complex systems; System control	3
<b>Active natural substances and materials</b> Materials; Natural resources; Natural bioactive compounds	3
<b>Fundamentals of nanosciences</b> Properties as a function of structure and dimensions; Design, creation and characterisation of nanostructures; Applied nanotechnology	3

Scope of studies: 6 modules  
Available: 11 modules worth 3 ECTS points each



EMERGENCY STOP

AUXILIARY

START

SPEED

OVERLOAD STOP

0 1 2 3 4 5 6 7 8 9 10

## General Information

### Educational Concept

The educational concept of “**blended learning**” combines independent learning with contact lessons. When preparing the courses, modern forms of teaching and learning, such as e-learning and case studies, have been taken into account. In seminars and workshops students discuss and deal with challenging issues and differing points of view. Complex issues will be explained by the instructors in the contact lessons. In the Master programme, great emphasis is placed on “**research learning**”, where traditional teaching is replaced by individual context-based knowledge generation. Following consultation with the Head of Master programme, it may be possible to complete a part of the studies at a foreign institute of higher education in a broadened context.

### Language

The language of teaching is English. The module examinations and the thesis have to be written in English.

### Start and Duration of Master Programme

In general the studies start in the autumn semester. It is also possible to start the studies in spring semester. The full-time study programme lasts three semesters. Part-time study is possible.

### Place of study

The basic modules are offered in Bern and Spiez. Major modules are conducted at the University of Applied Sciences and Arts Northwestern Switzerland where the student is enrolled. The thesis is carried out at an institute of the School of Life Sciences FHNW, or at a site of an industrial partner.

### Terms of admission

As a rule, outstanding bachelor’s degree qualifications are accepted for the Master programme.\*

- Candidates will be admitted without an entry examination if they have
- gained an FH-BSc in a related subject and graduated with grades of **A, B or ≥ 5**
  - demonstrated an equivalent qualification (e.g. FH-diploma or university)
  - adequate English competency

Motivated students who do not fulfill the entry requirements entirely can take an entrance examination.

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

CAE <i>Certificate of Advanced English</i>	IELTS <i>International English Language Testing System</i>	TOEFL <i>Test of English as a Foreign Language</i>	Advanced English (English III) <i>(module of the Bachelor programme at the School of Life Sciences FHNW)</i>		
		iBT	CBT	PBT	
CAE-A/B/C	6.0	83	220	550	5.0

In case of lower English competency (see table below), the applicants are admitted but have the obligation to improve their English during the Master’s studies. They may visit the Advanced English course offered by the School of Life Sciences or may visit other courses. At the end of the studies they have to prove that they have attained adequate English competency (see table above).

FCE <i>First Certificate in English</i>	IELTS	TOEFL	Intermediate English (English II) <i>(module of the Bachelor programme at the School of Life Sciences FHNW)</i>		
		iBT	CBT	PBT	
FCE-A/B	5.5	71	197	530	5.0

\*Graduates of a previous course of study from a scientific or technical institute of higher education (predecessors of the Bachelor’s degree) with two years of career experience and graduates from post diploma studies can receive credit points.

## Academic year Structure

Autumn semester		Spring semester	
Week 38	Week 7	Week 8	Week 24

(it is possible that general modules or final exams take place outside the semesters)

### Thesis:

June–February (full-time students)

June–June (part-time students)

### Deadline for application:

April 30th (autumn semester)

December 15th (spring semester)

### Fees/Materials

– Enrolment fee: CHF 200.–

– Tuition fee per semester: CHF 700.–\*

– Materials per semester: CHF 100.–

– It is expected that students own a personal notebook PC.

An extra fee of CHF 350.– for accommodation and meals is required for each entrepreneurial basic module in Spiez (mandatory).

\*For students domiciled in a Swiss canton, the Principality of Liechtenstein or an EU member state. All other students have to pay an enrolment fee of CHF 5,000.– per semester.



# University of Applied Sciences and Arts Northwestern Switzerland FHNW

The University of Applied Sciences and Arts Northwestern Switzerland FHNW has strong regional ties combined with a vibrant national and international dynamic. The FHNW has established itself as one of the leading and most innovative universities of applied sciences in Switzerland.

The FHNW incorporates nine faculties:

- School of Applied Psychology
- School of Architecture, Civil Engineering and Geomatics
- School of Art and Design
- School of Life Sciences
- Academy of Music
- School of Social Work
- School of Engineering
- School of Business
- School of Education

All federally-designated fields of study, with the exception of Health Sciences, are thus incorporated. The schools are primarily located in Aarau, Basel, Brugg-Windisch, Muttenz and Olten.

Each school and academy fulfills the performance-related mandates decreed by the Federal Office for Professional Education and Technology OPET: Education, Continuing Education, Applied Research & Development and External Consulting.

The degree courses are applied and market-oriented. They are taught on a full- or part-time basis or in combination with work placements. The FHNW has fully implemented the Bologna Declaration according to the OPET timetable. Bachelor degrees have been delivered since 2005: in autumn 2008 the Master degrees were launched.

Within the framework of quality assessment peer reviews, national and international experts deemed the FHNW to be eminently professional and at a high qualitative level. Open-ended authorisation to operate the FHNW was federally awarded at the end of 2003 and all degree courses were officially endorsed.

The FHNW delivers a diverse range of continuing education in all faculties: Master of Advanced Studies MAS, Diploma of Advanced Studies DAS, Certificates of Advanced Studies CAS, professional seminars and symposia. The university enjoys an outstanding reputation among decision makers. Applied Research and Development has a high priority. The FHNW develops research projects with national and international enterprises and institutions.

The FHNW promotes four key principles: innovation, interdisciplinarity, international cooperation and a collaborative atmosphere among staff, lecturers and students.

## Contact

University of Applied Sciences and Arts  
Northwestern Switzerland FHNW  
School of Life Sciences  
Prof. Georg Lipps, PhD  
Head of the Master Programme  
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CH-4132 Muttenz

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[www.fhnw.ch/lifesciences/master](http://www.fhnw.ch/lifesciences/master)

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University of Applied Sciences and Arts Northwestern Switzerland FHNW  
reserves the right to change details at any time.

**Deadline for application: April 30th/December 15th**  
**Application Form Master of Science in Life Sciences, School of Life Sciences**  
**(University of Applied Sciences and Arts Northwestern Switzerland FHNW)**

Personal Details		
Surname	First name	
Gender	<input type="checkbox"/> female	<input type="checkbox"/> male
Date of birth	Street/No.	
Postcode/location	Canton	State
Phone/home	Phone/work	Mobile
E-Mail		
AHV-No./SS-No.	Mother tongue	
Foreign citizenship	Place of birth	Nationality
Matriculation number	Place of origin	
Legal residency at start of studies		

Educational background:			
<input type="checkbox"/> Bachelor Degree in		Graduated	<input type="checkbox"/> yes <input type="checkbox"/> no
<input type="checkbox"/> FH diploma in		Grade	
<input type="checkbox"/> Other (please specify)		Remarks	

School of graduation:		
<input type="checkbox"/> University of Applied Sciences (FH)	Place/Country	Name of institution
<input type="checkbox"/> University	Place/Country	Name of institution
<input type="checkbox"/> Foreign institute of higher education	Place/Country	Name of institution

Type of matriculation		
Length of studies	from/to	Year graduated

Professional qualifications		
Name of company, location	Employed as	from/to

Attachments
<input type="checkbox"/> Letter of motivation 1 page English (required)
<input type="checkbox"/> Passport photograph with surname/first name on it (required)
<input type="checkbox"/> Bachelor degree with Transcript of Records or FH diploma (required)
<input type="checkbox"/> Curriculum vitae with references (required)
<input type="checkbox"/> Copies of certificates ( <i>finals exams, enrolment/matriculation/vocational diploma (BM-Zeugnis); internship (Praktikum)</i> )
<input type="checkbox"/> Proof of English proficiency (required)

Application and processing fee: By signing this application form it is understood that an application and processing fee of 200 Swiss francs is due. This amount will be invoiced by the Fachhochschule Nordwestschweiz following submission of the application, and is payable within 30 days. This fee applies regardless of whether studies are initiated.

Place, date	Signature

Please return the entire application form to:

**University of Applied Sciences and Arts Northwestern Switzerland FHNW, School of Life Sciences, Gründenstrasse 40, CH-4132 Muttenz**

## Application for the Modules

(provisional choice of module; definite study programme is defined during consultation with head of master programme)

<input type="checkbox"/> full time	<input type="checkbox"/> part-time
------------------------------------	------------------------------------

**Major** (select four modules: Three modules of the major, chose fourth freely among the offered modules.)

### Molecular Technologies (MT)

<input type="checkbox"/> Applied organic chemistry	<input type="checkbox"/> Chemical engineering	<input type="checkbox"/> Instrumental analytics
<input type="checkbox"/> Molecular assays	<input type="checkbox"/> Applied bioanalytics	

### Therapeutic Technologies (TT)

<input type="checkbox"/> Drug formulation and delivery	<input type="checkbox"/> Drug manufacturing	<input type="checkbox"/> Medical systems
<input type="checkbox"/> Implant development		

### Environmental Technologies (ET)

<input type="checkbox"/> Water management and treatment technologie	<input type="checkbox"/> Materials recovery technologies
<input type="checkbox"/> Environmental remediation	<input type="checkbox"/> Enviromental risk assessment

### Molecular Technologies/Therapeutic Technologies/Environmental Technologies

<input type="checkbox"/> Bio-Nanotechnology	<input type="checkbox"/> Sustainable production and clean technologies
<input type="checkbox"/> Life cycle assessment and regulatories	

### Entrepreneurial Basics (select three modules)

<input type="checkbox"/> Innovation and knowledgement management	<input type="checkbox"/> Communication and market
<input type="checkbox"/> Leadership	<input type="checkbox"/> Society, legislation and politics
<input type="checkbox"/> Business management	

### Extended Theoretical Basics (select six modules)

<input type="checkbox"/> Quality excellence	<input type="checkbox"/> Sociocultural and psychological aspects of sustainable development
<input type="checkbox"/> Health and nutrition	<input type="checkbox"/> Biodiversity assessment
<input type="checkbox"/> Applied statistics and mathematics	<input type="checkbox"/> Comparative physiology
<input type="checkbox"/> Data management and visualisation	<input type="checkbox"/> Industrial system theory
<input type="checkbox"/> Environmental policy and future models	<input type="checkbox"/> Active natural substances and materials
<input type="checkbox"/> Fundamentals of nanosciences	