

Master of Science in Life Sciences (MLS)

**Applied Biosciences
Chemical Development and Production
Natural Resource Management
Viticulture and Enology**

2019

swissuniversities

Hes·so

Haute Ecole Spécialisée
de Suisse occidentale

Fachhochschule Westschweiz

University of Applied Sciences and Arts
Western Switzerland

Master of Science HES-SO in Life Sciences

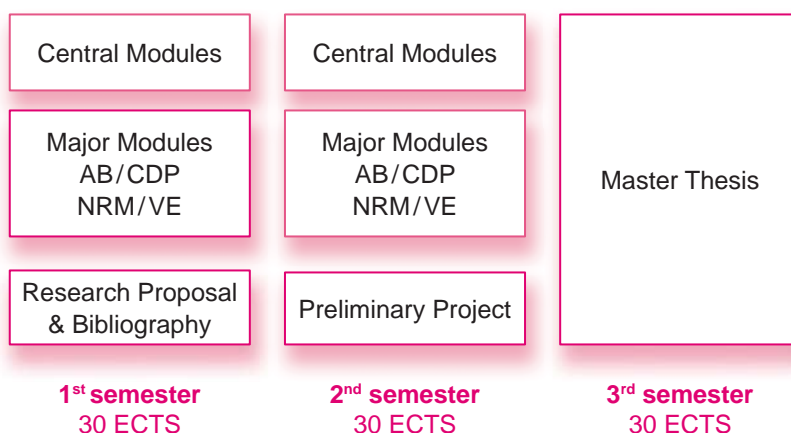
The Master of Science HES-SO in Life Sciences is a consecutive Master program with specializations in biotechnology, chemistry, natural resource management, and viticulture & enology. It is designed for highly motivated students who strive to improve their career perspectives. The Master of Science HES-SO in Life Sciences offers 4 majors:

- **Applied Biosciences (AB)**
- **Chemical Development & Production (CDP)**
- **Viticulture and Enology (VE)**
- **Natural Resource Management (NRM)**

The Master MLS offers a well-balanced curriculum accompanied with advanced specialization courses for each chosen major. These courses include business, management and data handling to master the challenges demanded by tomorrow's job market. Also, these courses are accompanied by a Master thesis as an independent applied research project.

The collaboration with BFH, FHNW and ZHAW offers students the unique opportunity to exchange their professional experiences and expand their personal networks within the entire Life Science community. The curriculum is divided into 3 blocks:

- Central modules (total of 30 ECTS) covering core expertise specific to the Life Sciences, including "Handling and Understanding Data", "Management, Business and Society" (7 modules at 3 ECTS), and cluster-specific modules related to the "Bio/ Pharma", "Chemistry", "Environment", and "Food". These modules are designed to strengthen the core-skills of the Master students in their chosen majors (up to 6 modules at 3 ECTS).
- Advanced specialization skills related to the particular majors (20 ECTS, five modules). These modules are characterized by high practical relevance, applied case studies, field trips, and participation with external experts.
- A Master project including a Research Proposal & Bibliography (4 ECTS), a Preliminary Project (6 ECTS), and the Master Thesis itself (30 ECTS; full-time in the last semester).



Applied Biosciences (AB)

HES-SO Valais Wallis – School of Engineering, Sion

The training programme of this specialization aims to broaden and deepen the students' understanding of the exciting field of biosciences, at the interface between biology and chemistry. It features a well-balanced combination of lectures and laboratory applications.

Through a transversal approach, the proposed formation provides the skills necessary to manage and to work on complex and multi-disciplinary Biotech, Medtech or Pharma projects in their entirety. Students are thus trained to develop a broad vision of industrial projects: from market research to the regulatory aspects through technical developments.

External lecturers from industry are invited on a regular basis to present and discuss various real-life examples from an expert point of view.

In the frame of this rich programme the students will :

- Step into the booming domain of **sustainable biotechnology** and explore the strategies and technologies that are paving the way to an oil-free, cleaner and more ethical future.
- Develop novel **analytical tools for the diagnostic industry**. Discover **advanced ways of running processes** using the most recent developments in Process Analytical Technologies (**PAT**).
- Gain a deep understanding of the pharmaceutical industry process from the **discovery to the manufacturing of drugs**.
- Acquire knowledge in the rapidly developing field of **genome analysis** and understand how gene functions and dysfunctions are related to diseases.
- Discuss real-world case studies of **Quality Management** and **Regulatory Affairs** and get expertise in these crucial fields for industry.

Also worth reminding here, the **Master Thesis** accounts for 40 credits out of 90 and **can be chosen among a large variety of topics**. It thus represents a fantastic opportunity for the candidates to fully express their scientific potential and project management skills.



“After my Bachelor’s degree, the question was to start the Master or not? I decided to go for it! A Master degree is the opportunity to expand your knowledge, to satisfy your curiosity, to quench your thirst for learning and discovery. In short, it is a chance to develop your skills even further. Studying a Master’s degree is completely different from a Bachelor’s: it’s more independent, interactive and dynamic, and the subjects are closer to reality.

A Master has the advantage of preparing you for working in the industry. In addition, a Master offers a new kind of social life. You meet people with different backgrounds, cultures and values. These contacts are enriching and open us to the world. It’s an excellent experience for our entire working life.”

*Delphine Balmer
MSc HES-SO in Life Sciences,
Major Applied Biosciences*

Chemical Development & Production (CDP)

School of Engineering and Architecture, Fribourg

The development of robust, safe, economical, and ecological chemical processes and their transfer into production remains a challenging task. Its success depends on the skills of highly talented and motivated process chemists who not only have a solid understanding of chemistry and chemical engineering, but who are also trained to work with state-of-the-art technologies and equipment.

The “Chemical Development & Production” major provides core theoretical and practical training for a career in the chemical and life sciences industries, enabling students to handle projects involving chemical production ranging ‘from the milligram to the ton’.

The “Chemical Development & Production” major covers the following subjects:

- **Route finding** and route selection for a given target molecule based on ecological assessment and the principles of **green chemistry**
- Understanding the concept of asymmetric synthesis and its application in the development of **chiral molecules**, including the use of bio-catalytic methods
- Route enabling and the **optimisation of synthetic routes** by automated experimentation based on simulation and statistical design
- Planning and performing ultrafast kinetic studies and thermal safety experiments to **evaluate the thermal risk** of a chemical process
- Developing **nanoparticle characterisation** methods (electron microscopy) and **chemical process analytics** (off-line, at-line, PAT) using multivariate data analysis and chemometrics.
- Applying the concepts of **chemical process development and scale-up** in an industrial context
- Designing **purification methods**, such as distillation or chromatography, on an industrial scale
- Understanding the concepts of **quality, validation, accreditation and regulatory aspects** (GMP, QA & QC, SOP, ISO...) in the chemical industry and their application
- Designing and operating a modern chemical production unit using **automation, process control and optimisation**
- **Flow chemistry**: converting batch processes into fully-monitored continuous operations
- Development of leadership and **project management** skills

Within the “Chemical Development & Production” major, students are challenged to work and interact in an interdisciplinary team of analytical chemists, process research and development scientists, chemical engineers and QC/QA professionals, while learning to manage and handle complex projects.



“The Master in Life Sciences program was for me a way of acquiring complementary education and making my career more fulfilling and successful. Even though the Master’s project itself is centered on a specific field, the overall program has enabled me to develop a wide spectrum of competences. Indeed, completing the Master’s work requires learning and perfecting one’s work management skills, which, later on, proves to be essential in the “real world”. I am currently working on an applied research project in a well-known Swiss company, where my main field of activity is process optimization and automation. I now realize that being a chemical engineer is not only about

chemistry and engineering. My daily job consists of learning the needs in the production processes and transforming my understanding of these needs into a practical prototype. Once the production managers and workers are happy with the solutions offered by the prototype, I contact the specialists and accompany them in implementing these solutions in production. The MLS program has greatly helped me in acquiring all the skills necessary in my job.”

*Benoît Stadler,
MSc HES-SO in Life Sciences
Major Chemical Development &
Production, Firmenich SA*





Natural Resource Management (NRM)

School of Engineering, Landscape and Architecture – hepia Geneva

The natural environment is now under increasing pressure from human activities. Natural resources are both consumed and altered, clearly questioning the sustainability of our societies.

The goal of this Master of Science HES-SO in Life Sciences « Natural Resource Management » is to provide students with the skills to design and implement the integrated and sustainable management of ecosystems and their productions at the regional scale of a catchment or an ecoregion.

The objectives of this Master are to provide the students with the following skills :

- **Designing a scientific and/or technical project related to conservation or management of ecosystems.** The basis of this objective is to gain a scientific approach to problems. Developing and planning a project in answer to a problem, as well as elaborating an interdisciplinary and participatory project are also addressed.
- **Characterising ecosystems and their interrelationships.** Students will learn to incorporate into their projects a technical approach for elaborating sampling methods and characterising ecosystems. These learning modules include the functioning of ecosystems, their integration into landscapes, their dynamics of degradation and their dysfunctions. The impact assessment of natural and anthropogenic disturbances is also addressed. Different dimensions of biodiversity are integrated in this approach, from genome to landscape, and are analysed using adapted tools, such as statistical methods and geographical information systems.
- **Identifying legal framework, stakeholders and conflicts of interest related to the use of natural resources.** The legal framework, actors and institutions in charge of management are identified in this module, as well as ecosystem uses and services. Analysis of issues, risks and conflicts of interest related to this process complete the societal framework for the use of natural resources in a context of sustainable development.
- **Preserving and/or restoring ecosystems and their functions.** This module aims to implement the process of developing management and action plans. The purpose is to define the objectives of conservation, exploitation and / or restoration of ecosystems and landscapes, design appropriate measures, plan implementation and develop a monitoring system, at local and regional scale. Valuing ecosystems in terms of social, cultural and economic development, as well as the management of conflicts of interest between ecosystem conservation and socio-economic uses, completes this approach of conservation.



“Following my Bachelor’s degree in natural resource management, I decided to continue my studies with a Master’s degree. I chose the Master MLS because I appreciate the applied and professionalized HES education. I’m also very interested in the multidisciplinary aspect of this Master, to develop entrepreneurial and management skills. In addition, I will be able to improve my English and meet people from diversified backgrounds

which is a great experience. In the MLS, I chose the NRM orientation to increase and expand my knowledge in the fields of natural resource management and landscape. I’m also looking forward to carry out my Master thesis to increase my professional experience and network.”

*Laurent Huber,
MSc HES-SO in Life Sciences,
Major Natural Resource Management*

Viticulture and Enology (VE)

Changins, School of Viticulture and Enology

The grape wine industry is confronted with ever increasing challenges. The ongoing climate change requires new cultivars and new production techniques; advances in modern technology call for new skills; the increasing complexity of the social and economic environment demands innovation and anticipation to satisfy rapidly changing needs.

The Viticulture and Enology specialization provides a global vision and tools to analyze and resolve complex situations from grape to wine to management to market on a strategic and operational level. It teaches efficiency and effectiveness in the economic, ecological and political environment of the grape wine industry. The acquired skills allow conceptual changes allowing to advance grape growing, wine making, and wine business.

The aim of the specialization viticulture and enology is to teach students to :

- Understand and analyze geological, pedological, and climatic components of the terroir of a vineyard
- Judge the relevance of choices and cultural techniques applied on a given vineyard in relation to environmental risks and propose solutions
- Develop strategies of varietal selection in the long term as a function of environmental pressure and climate changes
- Conduct and interpret a technical winery audit in order to propose improvements
- Acquire competences for the restructuring of a company related to viticulture, enology and management
- Acquire the fundamentals of time management, personal organization and communication
- Understand chemistry and analysis of key wine molecules and macromolecules and their importance for winemaking techniques, wine stability, color and aroma
- Learn innovative sensory evaluation techniques
- Explore the cognitive and psychophysical dimensions of perception and sensory analysis

CHANGINS offers significant career-advancing opportunities with the Master of Science HES-SO in Life Sciences, specialization Viticulture and Enology in grape growing and winemaking businesses, the agricultural and food industry, extension services, consultancies, government agencies and NGOs.



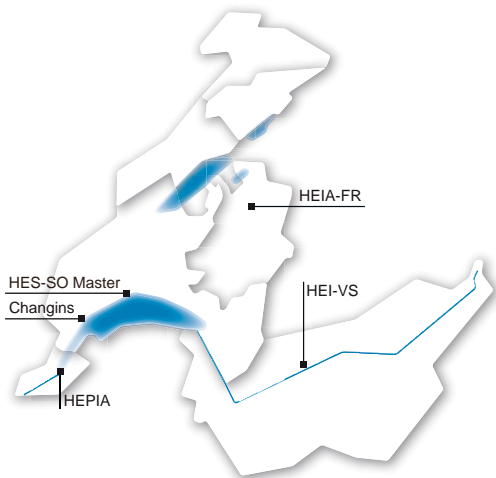
“After a BSc in enology and viticulture at Cal Poly and a number of jobs in wine production and vineyard services around California and New Zealand, I joined Changins because the courses and the research potential were a perfect fit. My Master’s project revolved around creating methodologies for applying low cost UAV imaging to viticulture. It boils down to what can we see in a vineyard from the air, and how can we use this information to make better farming decisions. Studying in Changins means being sandwiched between two mountain ranges, two city centers, a

lake and another country with plenty of culture and recreation to experience and explore. The varied physical landscape of the area means there quite a few different and unique wine growing regions all packaged within a small geographical space- perfect for any student and/or wine lover! The Master’s degree with its well-developed skill-set puts me in a favorable position with like-minded employers.”

*William Metz,
MSc in Life Sciences,
Major Viticulture and Enology*

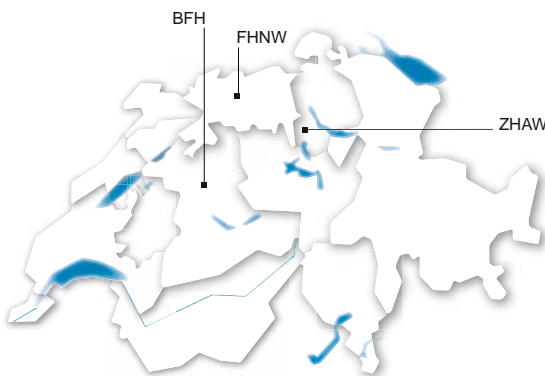
HES-SO

University of Applied Sciences and Arts Western Switzerland



Schools involved in the MLS programme

- School of Engineering and Architecture Fribourg (HEIA-FR)
heia-fr.ch
- Geneva School of Engineering, Architecture and Landscape - HEPIA
hesge.ch/hepia
- School of Engineering – HES-SO Valais-Wallis – HEI
hevs.ch
- Changins, School of Viticulture and Enology
changins.ch



Other partner schools

- BFH – School of Agricultural, Forest and Food Sciences HAFL
- FHNW – School of Life Sciences
- ZHAW – School of Life Sciences and Facility Management

More information :
mslcommunitycentre.ch

Impressum

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Admission requirements

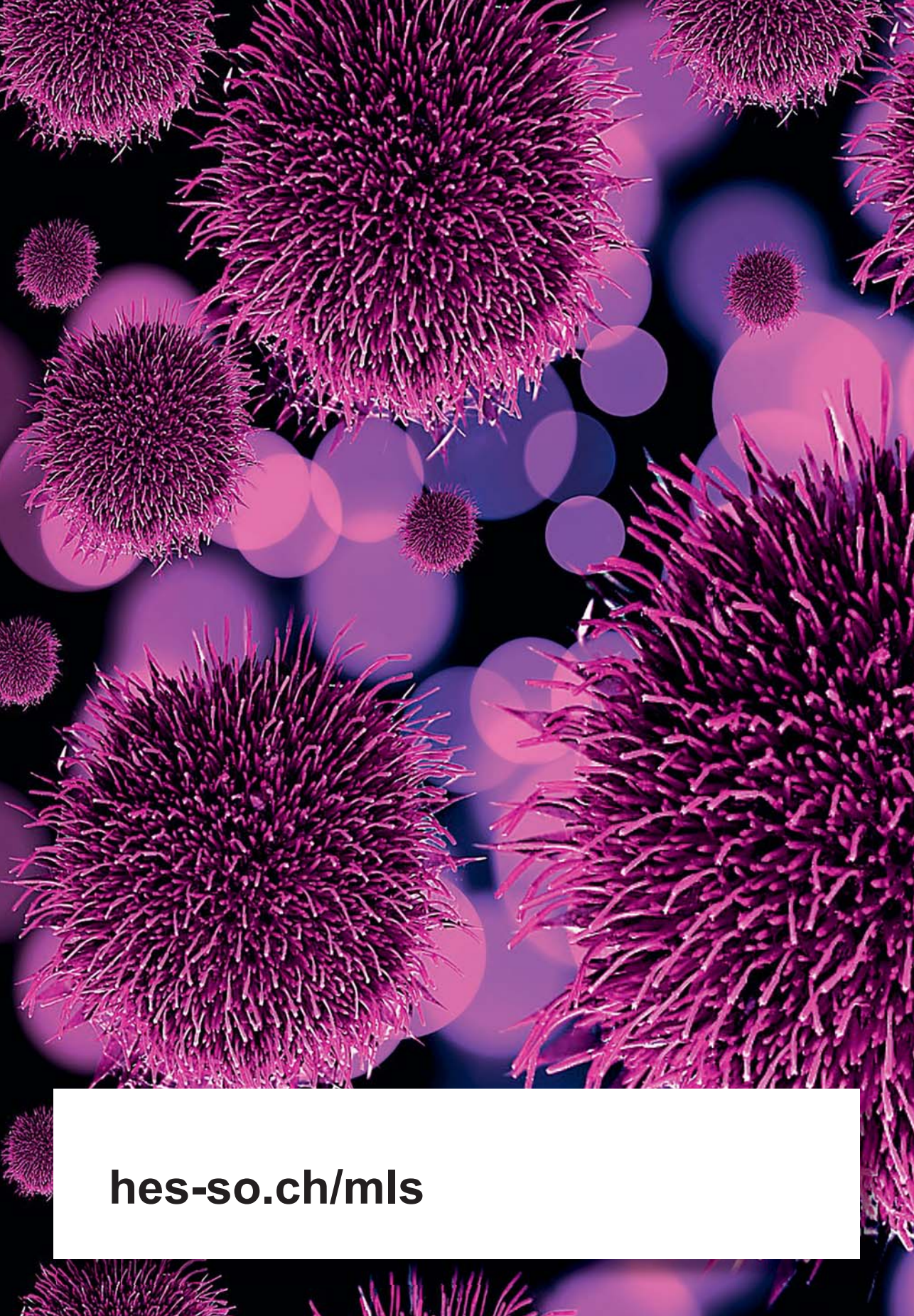
The right of admission is decided on the basis of the candidate's dossier and the requirements are as follows :

- UAS Bachelor's degree in a related field
- Bachelor's degree in a related field from a University or Federal Institute of Technology, subject to completing a practical internship related to the chosen major
- Other applications are judged on the academic curriculum and the practical experience related to the chosen major

Registration forms and deadlines : **hes-so.ch/mls**

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