

Master of Science in Life Sciences (MSLS) - Curriculum 2018

The cooperation between the four Universities of Applied Sciences Berner Fachhochschule BFH, Fachhochschule Nordwestschweiz FHNW, Haute école spécialisée de Suisse occidentale HES-SO, and Zürcher Fachhochschule für Angewandte Wissenschaften ZHAW was established in 2009 to offer a Master of Science in Life Sciences. The degree programme comprises common modules organized centrally as well as fifteen different specialisations with modules taught at the partner schools. This cooperation enables students to exchange their professional experience and expand their personal networks.

In 2017, the selection of common modules was substantially redesigned. The new 'Curriculum 2018' will become effective as of September 2018.

The Master of Science in Life Sciences (MSLS) targets talented Bachelor graduates, who decide to embark on a Master's course, are highly motivated, and strive to improve their career perspectives in the private or public sector. It builds on 24 different Bachelor of Science (B.Sc.) programmes at the four partner schools, and accepts B.Sc. graduates in Life Sciences from other Swiss universities and from all over the world. Successful MSLS graduates are equipped to work in positions with high responsibility – or in applied research – in the 'industry', that is, private and public sector organisations such as companies, non-governmental organisations and public administration in the field of Life Sciences. They are prepared to immediately work in a productive way, assume responsibility, critically reflect on their activities, and further develop their capabilities throughout their professional lives.

The fifteen specialisations are organised in four clusters and one group (Table 1). HES-SO Master offers four specializations:

- Applied Biosciences (AB) in Sion
- Chemical Development and Production (CDP) in Fribourg
- Natural Resource Management (NRM) in Genève
- Viticulture and Enology (VE) in Changins

Table 1: MSc in Life Sciences - Clusters and specialisations

Cluster	Specialisation	University	Site
Bio/Pharma	Applied Biosciences	HES-SO	Sion
	Bioanalytics	FHNW	Muttenz
	Pharmatechnology	FHNW	Muttenz
	Pharmaceutical Biotechnology	ZHAW	Wädenswil
Chemistry	Chemical Development and Production	HES-SO	Fribourg
	Chemistry	FHNW	Muttenz
	Chemistry for the Life Sciences	ZHAW	Wädenswil
Environment	Agricultural and Forest Sciences	BFH	Zollikofen
	Environmental Technologies	FHNW	Muttenz
	Natural Resource Management	HES-SO	Geneva
Food	Food and Beverage Innovation	ZHAW	Wädenswil
	Food, Nutrition and Health	BFH (HES-SO)	Zollikofen
	Viticulture and Enology	HES-SO	Changins
Group BECS¹	Applied Computational Life Sciences	ZHAW	Wädenswil
	Biomedical Engineering	FHNW	Muttenz

¹ Biomedical Engineering and Computational Science

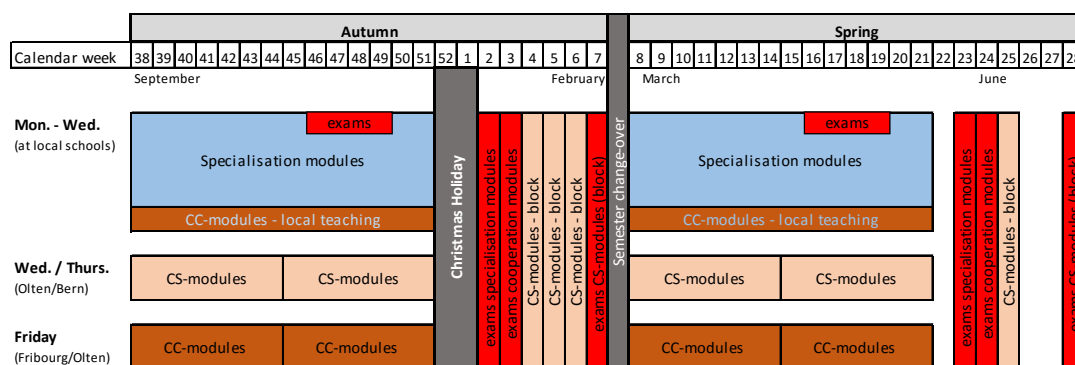
Cooperation modules are divided into core competence modules relevant to all specialisations, and cluster-specific modules relevant to all the specialisations within one cluster. All cooperation modules are awarded three ECTS. Out of seven core competence modules, at least 5 have to be completed (Table 2). Each cluster offers of up to 6 cluster-specific modules, of which at least 3 have to be completed.

Table 2: MSc in Life Sciences – New Curriculum 2018

Module	Responsible	ECTS	Offer	Option
Core competences modules (CC)	MSLS cooperation	30 ECTS	7 Modules of 3 ECTS	Minimum 5 modules
Cluster-specific modules (CS)			5-6 Modules of 3 ECTS	Minimum 3 modules
Specialisation modules (S)	HES-SO Master MLS	20 ECTS	By specialization AB, CDP, NRM, VE	Compulsory
Master's thesis		40 ECTS	40 ECTS (X01, X02, X03)	Compulsory

All cooperation modules are taught at specific locations (Olten, Fribourg, Bern or at a partner university), and last either 7 weeks (half a semester) or are organised into a block week (Figure 1); 2-4 weeks are reserved for final exams, which are organised simultaneously at the local schools. The class schedules for the different specializations AB/CDP/NRM/VE will be available in Spring 2018 on www.hes-so.ch/mls

Figure 1: Schedule of curriculum MSLS 2018



Core competence modules (CC)

With the challenges coming from the market (Big Data, Industry 4.0), as well as the need to understand entrepreneurship, innovation and business, the new core competence modules encompass the most important competences for Life Science specialists in two fields (Table 3 and Figure 2):

- Management, Business and Society, and
- Handling and Understanding Data

They represent a well-designed set of core competences in a seminal field (data literacy) and a field required by potential employers (business literacy). In each group, modules build on each other.

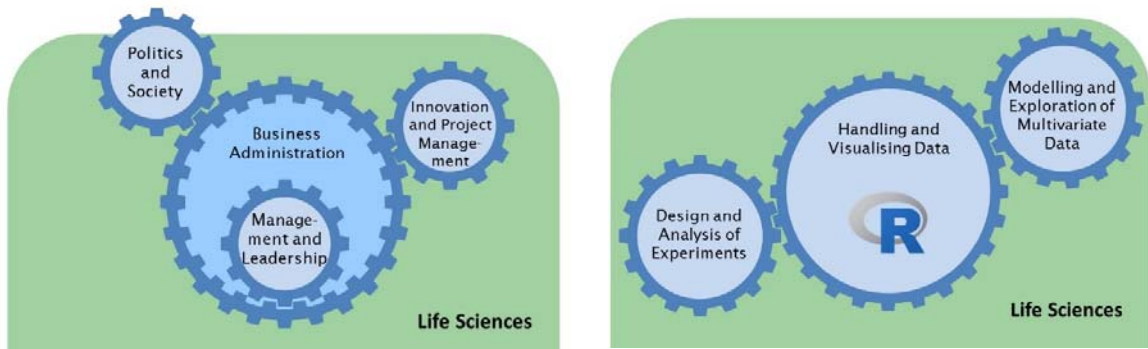
Table 3: Core competence modules

Group	Code	Module
Management, Business and Society	B1	Business Administration for Life Sciences
	B2	Management and Leadership for Life Sciences
	B3	Innovation and Project Management
	B4	Politics and Society
Handling and Understanding Data	D1	Handling and Visualising Data
	D2	Design and Analysis of Experiments
	D3	Modelling and Exploration of Multivariate Data

These modules are partly taught in large groups (80-100 students), making up two-thirds of the contact lessons, as well as locally in small, homogeneous groups (approx. 20 students). The large-group teaching is in Fribourg for students from HES-SO and BFH (in Olten for students from FHNW and ZHAW). It takes place on 3 ½ Fridays per module and is spread over half of the semester. Local teaching takes place intermittently between the large-group teaching sessions on Mondays, Tuesdays or Wednesdays (the local school defines the timetable).

Local teaching works with didactical concepts typical for smaller groups (exercises, cases studies, debates, group work etc.) and focuses on examples from each specialisation.

Figure 2: Overview of core competence modules



Cluster-specific modules (CS)

For each cluster, a cluster committee agreed on the offer of the cluster-specific modules. These modules are taught either over half a semester on Thursdays or in one-week blocks as summer or winter schools (Table 4).

The new module descriptions will become available by the end of April 2018 on the MSLS Community Centre (mslscommunitycentre.ch).

Specialization modules (S)

Each of the four specializations of HES-SO Master MLS offers five specialization modules. These modules are taught at the local schools (AB in Sion, CDP in Fribourg, NMR in Genève, and VE in Changins, see Table 5). Detailed module descriptions can be found on www.hes-so.ch/mls

Table 4: Cluster-specific Modules

Cluster	Code	Module	Module coordinator (School)	Venue	Form
Bio/Pharma	BP1	Compound Profiling in Pharmaceutical Drug Discovery	Veronika Butterweck (FHNW)	Olten	Half-semester
	BP2	Drug Formulation and Delivery for Solid Dosage Forms	Georgios Imanidis (FHNW)	Olten	Half-semester
	BP3	Design of Biopharmaceutical Production Facilities	Dieter Eibl (ZHAW)	Wädenswil	Block
	BP4	Regulatory Affairs	Marc Pfeifer (HES-SO)	Sion	Block
	BP5	Physiology and Immunotherapies	Bruno Schnyder (HES-SO)	Bern	Half-semester
	BP6	Tissue Engineering for Drug Discovery	Michael Raghunath (ZHAW)	Bern	Half-semester
Chemistry	C1	Materials Science	Michael de Wild (FHNW)	Olten	Half-semester
	C2	Surface Characterisation	Michael de Wild (FHNW)	Olten	Half-semester
	C3	Polymers and Applications	Pierre Brodard (HES-SO)	Fribourg	Block
	C4	Chemistry and Energy	Jürgen Stohner (ZHAW)	Olten	Half-semester
	C5	Green Chemistry	Jürgen Stohner (ZHAW)	Olten	Half-semester
Environment	E1	Journal Club Environmental and Natural Resource Sciences	Lindsey Norgrove (BFH)	Bern	Half-semester
	E2	Life Cycle Assessment	Jan Grenz (BFH)	Bern	Half-semester
	E3	Sustainable Natural Resource Management	Dominic Blättler (BFH)	Zollikofen	Block
	E4	Ecological Infrastructure in Landscapes	Claude Fischer (HES-SO)	Geneva	Block
	E5	Biodiversity	Andreas Stampfli (BFH)	Bern	Half-semester
	E6	Water Management for Households, Industry and Agriculture	Thomas Wintgens (FHNW)	Olten	Half-semester
Food	F1	Progresses in Food Processing	Michael Beyrer (BFH)	Sion	Block
	F2	Advanced Sensory Techniques	Pascale Deneulin (HES-SO)	Changins	Block
	F3	Foodomics	Wolfram Brück (BFH)	Bern	Half-semester
	F4	Sustainable Sourcing, Processing and Tracing of Food	Claudia Müller (ZHAW)	Olten	Half-semester
	F5	Nutrition and Nutrition Related Chronic Diseases	Beatrice Baumer (ZHAW)	Olten	Block
BECS	BECS1	Modelling of Complex Systems	Sven Hirsch (ZHAW)	Olten	Half-semester
	BECS2	Machine Learning and Pattern Recognition	Krzysztof Kryszczuk (ZHAW)	Olten	Half-semester
	BECS3	Medical Imaging and Image Processing	Alex Ringenbach (ZHAW)	Olten	Half-semester
	BECS4	Optimisation Methods	Erik Schkommodau (FHNW)	Olten	Half-semester

Table 5: Specialization Modules of the Master HES-SO MLS

Specialization MLS	Specialization Modules
Applied Biosciences (AB, Sion)	<ul style="list-style-type: none"> • Genomics and genome analysis • Quality Management & Regulatory Affairs • Sustainable Biotechnology • Pharmaceutical Sciences Technologies • Bioanalytics and Diagnostics
Chemical Development and Production (CDP, Fribourg)	<ul style="list-style-type: none"> • Process Chemistry and Development • Process Design and Optimization • Chemical Engineering & Process Intensification • Safety, Production and Quality • Analytics and Characterization
Natural Resource Management (NRM, Genève)	<ul style="list-style-type: none"> • Ecological assessment and functioning of landscapes • Conservation of natural and agro-ecosystems • Conservation in context: Social Sciences tools for conservation • Ecosystem restoration (natural, rural or urban environments) • Sustainable and optimized use of the natural resources
Viticulture and Enology (VE, Changins)	<ul style="list-style-type: none"> • Grapevine Environment - Sustainable Viticulture • Genetic Resources and Grapevine Production • Wine and Winery Design • Wine Chemistry and Analytical Techniques • Wine Business Management