

# MSc in Life Sciences (MSLS)

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## Curriculum 2018

### Background

The MSLS cooperation was established in 2009 between the four Universities of Applied Sciences BFH, HES-SO, FHNW and ZHAW to offer an MSc in Life Sciences. The degree programme comprises common modules organised centrally, as well as fifteen different specialisations with modules taught at the partner schools. In 2017, MSLS redesigned its offer of cooperation modules substantially. The new 'Curriculum 2018' will become effective as of September 2018.

### Overview

The MSc in Life Sciences targets the best BSc 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 BSc programmes at the four partner schools, and accepts BSc graduates in Life Sciences from other Swiss universities and from all over the world. Successful MSLS graduates are equipped to work in responsible positions – or in applied research – for 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 actions, and further develop their capabilities throughout their professional lives.

The fifteen specialisations are organised into four clusters and one group (Table 1). The students choose one specialisation from one cluster.

**Table 1: MSc in Life Sciences - Clusters and specialisations**

Cluster	Specialisation	University	Site
<b>Bio/Pharma</b>	Applied Biosciences	HES-SO	Sion
	Bioanalytics	FHNW	Muttenz
	Pharmatechnology	FHNW	Muttenz
	Pharmaceutical Biotechnology	ZHAW	Wädenswil
<b>Chemistry</b>	Chemical Development and Production	HES-SO	Fribourg
	Chemistry	FHNW	Muttenz
	Chemistry for the Life Sciences	ZHAW	Wädenswil
<b>Environment</b>	Agricultural and Forest Sciences	BFH	Zollikofen
	Environmental Technologies	FHNW	Muttenz
	Natural Resource Management	HES-SO	Geneva
<b>Food</b>	Food and Beverage Innovation	ZHAW	Wädenswil
	Food, Nutrition and Health	BFH (HES-SO)	Zollikofen
	Viticulture and Enology	HES-SO	Changins
<b>Group BECS<sup>1</sup></b>	Applied Computational Life Sciences	ZHAW	Wädenswil
	Biomedical Engineering	FHNW	Muttenz

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<sup>1</sup> Biomedical Engineering and Computational Science

Cooperation modules are awarded three ECTS. They are divided into core competence modules relevant to all specialisations, and cluster-specific modules relevant to all the specialisations within one cluster. Out of seven core competence modules, at least 5 have to be completed (Table 2). Each cluster offers up to 6 cluster-specific modules, of which at least 3 have to be completed. Specialisations offer varying numbers of subject-specific modules and require either 20 or 30 ECTS to be acquired from these, with the Master's thesis providing a further 40 or 30 ECTS respectively.

**Table 2: MSc in Life Sciences – module categories**

Modules	Offer	Minimum required	Organisation
Core competence modules	7 modules with 3 ECTS each	5 (i.e. 15 ECTS)	MSLS cooperation
Cluster-specific modules	4-6 modules with 3 ECTS each	3 (i.e. 9 ECTS)	
Specialisation modules	Variable	20 or 30 ECTS	Partner schools
Master's thesis	30 or 40 ECTS	30 or 40 ECTS	
<b>Total</b>		<b>90 ECTS</b>	

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. 2-4 weeks are reserved for final exams, which are organised simultaneously at the local schools.

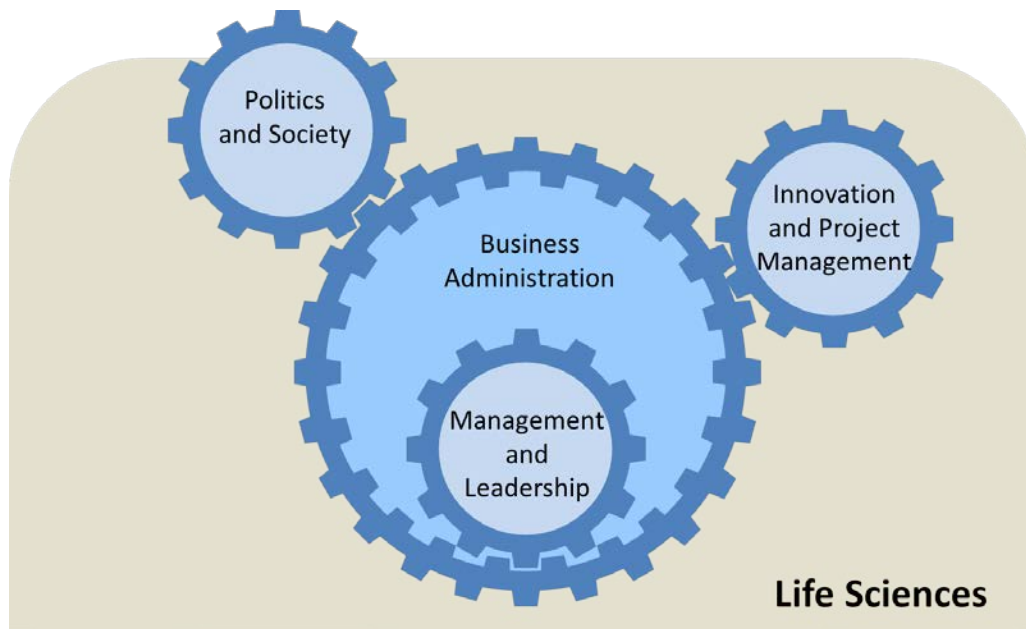
### Core competence modules (CC)

Core competence modules encompass the most important competences for Life Science specialists in two fields: 1) Handling and Understanding Data, and 2) Management, Business and Society (Table 3). 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.

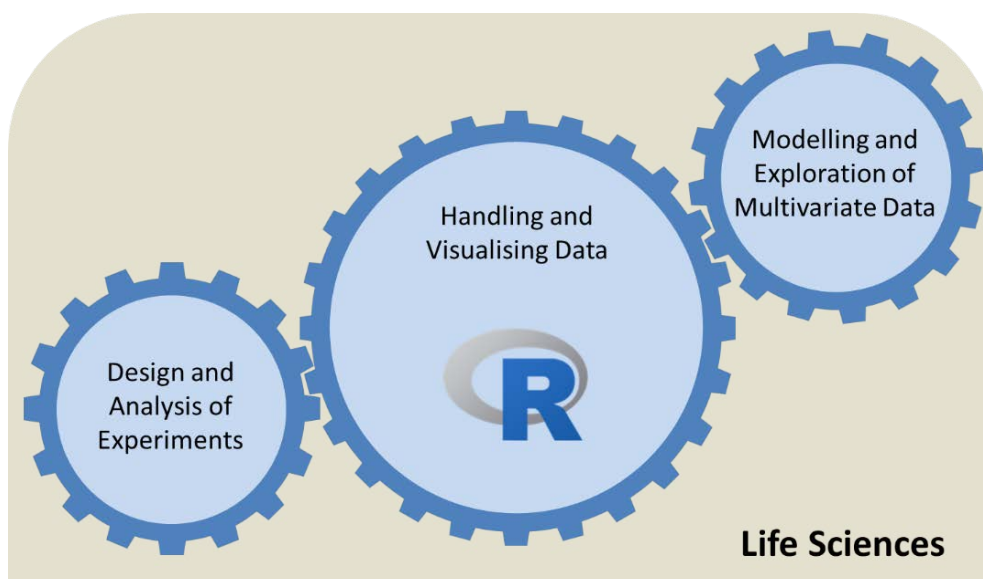
**Table 3: Core competence modules**

Group	Code	Module	Module coordinator
<b>Management, Business and Society</b>	B1	Business Administration for Life Sciences	Daniel Spinnler
	B2	Management and Leadership for Life Sciences	Daniel Spinnler
	B3	Innovation and Project Management	Robert Vorburger
	B4	Politics and Society	Ian Jennings
<b>Handling and Understanding Data</b>	D1	Handling and Visualising Data	Manuel Gil
	D2	Design and Analysis of Experiments	Christoph Kopp
	D3	Modelling and Exploration of Multivariate Data	Thomas Ott

These modules are partly taught in large groups (80-100 students), making up two-thirds of the contact lessons, as well as being taught locally in small, homogeneous groups (20-30 students). The large-group teaching is in two locations: Fribourg for students from BFH and HES-SO, and 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. It also has the advantage of reducing students' travelling time.



**Figure 1: Core competence modules Business Literacy**



**Figure 2: Core competence modules Data Literacy**

## Cluster-specific modules (CS)

For each cluster, a cluster committee agreed on subject matter most relevant to all specialisations of the cluster. The respective contents were included in the cluster-specific modules. These modules are given either over half a semester on Thursdays (exception Wednesday for Group BECS) or in one-week blocks as summer or winter schools.

**Table 4: Cluster-specific modules**

Cluster	Code	Module	Module coordinator (School)	Venue	Form
<b>Bio/Pharma</b>	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
<b>Chemistry</b>	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
<b>Environment</b>	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
<b>Food</b>	F1	Progresses in Food Processing	Michael Beyrer (BFH)	Sion	Block
	F2	Nutrition and Nutrition Related Chronic Diseases	Beatrice Baumer (ZHAW)	Olten	Block
	F3	Foodomics	Wolfram Brück (BFH)	Bern	Half-semester
	F4	Sustainable Sourcing, Processing and Tracing of Food	Claudia Müller (ZHAW)	Olten	Half-semester
	F5	Advanced Sensory Techniques	Pascale Deneulin (HES-SO)	Changins	Block
<b>BECS</b>	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

The new module descriptions will come available by the end of April 2018 on the MSLS Community Centre (<https://mslscommunitycentre.ch/>).

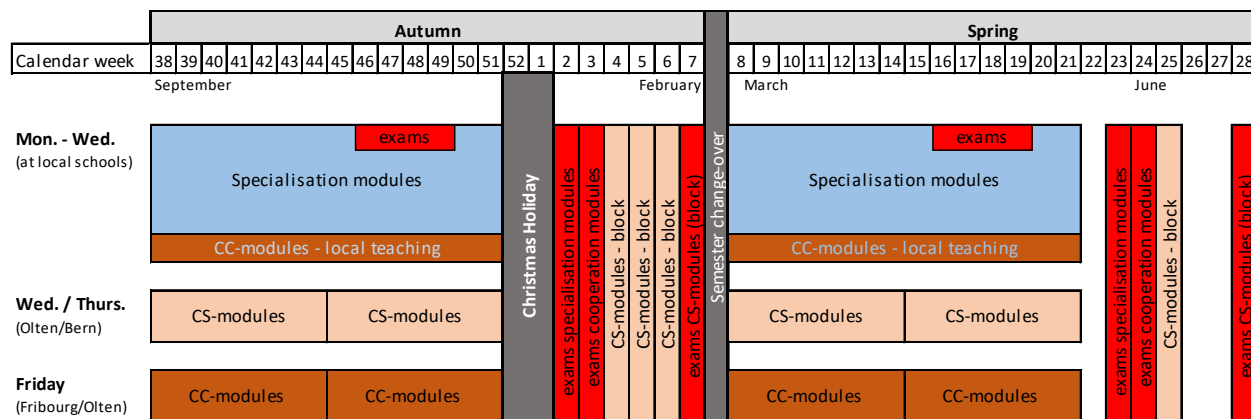
## Specialisation modules ZHAW

Here an overview, which modules are offered in your chosen specialisation. All modules take place in Wädenswil. Most of the module descriptions are already online and the others will come available by the end of April 2018 (<https://www.zhaw.ch/en/lspm/study/studiweb/master-ls/module-descriptions/>).

**Table 5: specialisation modules ZHAW**

Specialisation	Module
<b>Food and Beverage Innovation (FBI)</b>	Food Innovation
	Product and Process Design
	Managing the Food Supply Chain
	Food, Society and Nutrition
	Digital Food Business
<b>Pharmaceutical Biotechnology (PB)</b>	Biodesign: Ways to active pharmaceutical ingredients
	Bioprocessing and Bioanalytics
	Downstream and Safety
	Drug Formulation and Biological Test Systems
<b>Chemistry for the Life Sciences (CLS)</b>	Small Active Molecules
	Big Active Molecules
	Biomaterial and Functional Surfaces
	Analytical Technologies
	Green Chemistry – Advanced Concepts
<b>Applied Computational Life Sciences (ACLS)</b>	Programming, Algorithms and Data-Structures
	Mathematical Modelling
	Databases and Data Architecture Systems
	Machine Learning and Pattern Recognition
	Neural Networks and Deep Learning
	Computational Life Science Seminar
	Track module 1
	Track module 2

## Semester structure



**Figure 3: Schedule of curriculum MSLS 2018**

The Annual Plan will be online by the end of April 2018 on the MSLS Community Centre (<https://mslscommunitycentre.ch/>).