




Module Offer

		Module	Venue	Semester	Day	Biomedical Engineering	Chemistry	Bioanalytics	Pharmatechnology	Environmental Technologies	Contents	
Core Competences	Data	Handling and Visualizing data	Olten & Muttenz	AS-1	lectures Fridays in Olten, exercises Monday-Wednesday in Muttenz						introduction to R, organising data, databases, describing data: scatter, skewness, outliers, visualising data, informative plots	choose at least five modules
		Design and Analysis of Experiments	Olten & Muttenz	AS-2							statistical interference, experimental design, feasibility, efficiency and power of experiment designs, statistical analysis, interpretation and visualisation of results	
		Modelling and Exploration of Multivariate Data	Olten & Muttenz	AS-2							modelling: linear, nonparametric and multiple regression, model selection and diagnosis; exploration: visual inspection, principal component analysis, clustering	
	Business, Management & Society	Business Administration for Life Sciences	Olten & Muttenz	SS-1							business models, marketing, production, sourcing, capital budgeting, financial accounting, cost accounting	
		Management and Leadership for Life Sciences	Olten & Muttenz	SS-1							management, corporate ethics, strategic management, HR-management, leadership, change management	
		Innovation and Project Management	Olten & Muttenz	SS-2							entrepreneurship, megatrends, innovation management, presentation techniques, project management	
		Politics and Society	Olten & Muttenz	SS-2							politics: a process of negotiation, struggle and compromise; the role of the society; public opinion, responsibility, ethics	
Specialisation Modules at School of Life Sciences FHNW	Implant Design and Manufacturing	Muttenz	SS	Monday - Wednesday						patient-specific implants, medical additive manufacturing	for each specialisation you have to choose a minimum number of modules from the compulsory elective modules, depicted in dark green	
	Sensors and Signal Processing	Muttenz	AS							sensors for implants; noise reduction, filtering and error corrections		
	Medical Device Development	Muttenz	SS							development process, regulatory, risk management procedures		
	Surgical Robotics	Muttenz	SS							robot kinematics, robot dynamics, safety; practical exercise		
	Biointerface Engineering	Muttenz	AS							bioconjugation, chemical and topographical surface modifications, surface (nano)structuring, surface-biomolecule/cell/tissue interactions, biocompatibility		
	Synthetic and Medicinal Chemistry	Muttenz	AS							selectivity in organic synthesis, organometallic reactions, catalysis in chemical synthesis, hits to leads to candidate drugs, drug synthesis, kinase inhibitors		
	Advanced Mass Spectrometry and NMR Spectroscopy	Muttenz	SS							MS-ionization methods, UHPLC-MS, metabolic profiling, protein mass spectrometry, two-dimensional NMR, LC-NMR		
	Process Development and Technology	Muttenz	SS							separation principles, mass and energy balances, process design and layout studies		
	Reaction Technology	Muttenz	SS							reactor technology, reaction kinetics, simulation of reactions, operational modes, regulatory		
	Proteomics and Protein Analytics	Muttenz	SS							protein identification by mass spectrometry, posttranslational modifications, light-scattering, infrared spectroscopy, calorimetry, turbidimetry		
	Genomics	Muttenz	AS							next generation sequencing technologies, genomics in a clinical context, liquid biopsy, practical exercise, student workshop: genome engineering		
	Bioassays: Engineered Cells, Tissues and Organisms	Muttenz	SS							reporter cell assays, organ chips, zebrafish, daphnia		
	Continuous Pharmaceutical Production	Muttenz	AS							continuous production of solid forms and of extrudates, incl. laboratory course at an industrial site		
	Pharmaceutical Production Facilities	Muttenz	AS							design of production plants; containment systems; heating, ventilation, air-conditioning (HVAC); water, vapour and gas distribution		
	Formulation of Biologics and Routes of Drug Delivery	Muttenz	AS							formulation and delivery of biologics (liquid and solid forms), drug delivery, drug targeting		
	Cost Effectiveness of Sustainable Production and Risk Reduction in Industries	Muttenz	SS							cost-benefit concepts, circular economy		
	Material Recovery Methods and Technologies	Muttenz	AS							material and mass flow analysis, separation and conversion technologies		
	Industrial Pollution Control and Resource Recovery Applications	Muttenz	AS							industrial environmental technologies, sustainable production, resource recovery case studies		
	Water and Wastewater Treatment Technologies	Muttenz	SS							water quality parameters, water purification, waste water treatment, practical exercise		
Environmental Risk Assessment	Muttenz	SS						exposure assessment, fate of pollutants, environmental effects of pollutants, health implications of pollutants				
Environmental Bioremediation	Muttenz	SS						biogeochemical considerations, microbial bioremediation of organics, microbial bioremediation of organics and inorganics, phytoremediation, emerging contaminants, literature seminar				
Environmental Remediation	Muttenz	AS						management and monitoring of contaminated sites, economic and risk aspects of remediation, analytical tools, physico-chemical remediation technologies, case study shooting ranges				
Cluster-specific Modules	Group BECS	Modeling of Complex Systems	Olten	AS-1	Wednesday						system theory, system dynamics, modeling software Vensim, numerical integration methods, Monte-Carlo simulation	choose at least three modules (preferably from your cluster)
		Machine Learning and Pattern Recognition	Olten	AS-2							Bayesian inference, graphical models, classification, ensemble methods	
		Medical Imaging and Image processing	Olten	SS-1							quantitative image processing, segmentation, registration, classification	
		Optimisation Methods	Olten	SS-2							linear, non-linear, deterministic and stochastic optimization methods; Matlab exercises	
	Cluster Chemistry	Materials Science	Olten	AS-1	Thursday						solid state bulk materials, crystallographic and electronic structure, structural, optical, mechanical and magnetic properties, metallic and ceramic materials, nanoscale materials	
		Surface Characterisation	Olten	AS-2							modern microscopic and spectroscopic surface characterization techniques: advanced microscopy, infrared and Raman spectroscopy, EDX, WDX, XPS; Interactions with surfaces: SPR, QCM, OWLS,	
		Polymers and Applications	Fribourg	AS-B3							polymer synthesis, polymer characterization, biopolymer, polymer processing	
		Green Chemistry	Olten	SS-1							green chemistry metrics, industrial green chemistry, green solvents	
		Chemistry and Energy	Olten	SS-2							chemical energy storage, biogas, bioenergy, photocatalysis, photovoltaics, energy and mobility	
	Cluster Bio/Pharma	Compound Profiling in Pharmaceutical Drug Discovery	Olten	AS-1	Thursday						target identification, clinical candidate selection, ADME, toxicology assessment, validity of test models, extrapolation from animal and in vitro studies to man	
		Drug Formulation and Delivery for Solid Dosage Forms	Olten	AS-2							controlled release technologies, per-oral drug delivery, formulation of poorly-water soluble drugs, biopharmaceutical modeling	
		Design of Biopharmaceutical Production Facilities	Wädenswil	AS-B1							facility concept, modularization of production facilities, zone concept, regulatory aspects, supply chain, automation	
		Regulatory Affairs	Sion	2018-SS-B1 AS-B3							quality management in production and development, license application process	
		Physiology and Immunotherapies	Bern	SS-1							3D-construction of human tissues, co-cultures of blood immune cells and infectious microorganisms, immune-based therapies	
		Tissue Engineering for Drug Discovery	Olten/Bern	SS-2							tissue engineering techniques, bioprinting, skin, cosmetic testing, engineered liver and kidney, cancer models	
	Cluster Environment	Journal Club Environmental and Natural Resource Sciences	Bern	AS-1	Thursday						scientific publishing, reading and presenting selected publications, discussion and wrap-up of groups of related publications	
		Life Cycle Assessment	Bern	AS-2							seminal examples of LCA, use and misuse of LCA, environmental management methods, steps of an LCA procedure	
		Sustainable Natural Resource Management	Zollikofen	AS-B1							Rio+20, conflicts in natural resources management, challenges	
		Ecological Infrastructure in Landscapes	Geneva	AS-B3							landscape and movement ecology, GIS tools, ecological infrastructure, ecological connectivity, land-use planning	
		Biodiversity	Bern	SS-1							global change, species loss, functioning of the ecosystem, ecosystem services, international conventions, biodiversity maintenance	
Water Management in Households, Industry and Agriculture		Olten	SS-2							water resources, water supply and distribution, water use, water cycle management		
Cluster Food	Progresses in Food Processing	Olten	AS-B1/2	Thursday						food processing techniques, practical on shelf life extension and micro-encapsulation		
	Advanced Sensory Techniques	Olten	SS-B1							innovative sensory evaluation methods, analysis of sensory data, cognitive and psychophysical aspects of perception		
	Foodomics	Bern	SS-1							digestive tract and ingestion, techniques for nutrigenome, microbiome and metabolome analysis, data mining		
	Sustainable Sourcing, Processing and Tracing of Food	Olten	SS-2							process analysis, sustainable agriculture, social aspects, sourcing, energy management, sustainable diet, customer information		
	Nutrition and Nutrition Related Chronic Diseases	Olten	AS-B3							healthy and unhealthy diets, epidemiology, diet as risk factor for diseases, public health approaches		

Cluster-specific Modules in yellow are organized by the School of Life Sciences

AS: autumn semester
 SS: spring semester
 -1 or -2: first or second half of semester
 Bx: block week at the end of the semester

 compulsory elective modules
 elective modules (1st choice)
 elective modules (2nd choice)

subject to changes, 06.03.2018, Georg Lipps

Annual Plan Master of Sciences in Life Sciences

