

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		
		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							active and passive medical implants, "hands on" design of patient-specific implants, medical additive manufacturing, test methods for medical implants		
	Sensors and Signal Processing	MuttENZ	AS									sensors for implants; noise reduction, filtering and error corrections	
	Model-Based Signal Processing and Medical Diagnostics	MuttENZ	AS									bioelectrical signals, physical diagnostic measurements, model-based signal analysis, pattern detection, signal classification	
	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	Modelling of Complex Systems	Olten	AS-1	Wednesday						system theory, system dynamics, modeling software Vensim, numerical integration methods, Monte-Carlo simulation		
		Machine Learning and Pattern Recognition	Olten	AS-2								Bayesian inference, graphical models, classification, ensemble methods	
		Medical Imaging and Image Processing	Olten	SS-2								quantitative image processing, segmentation, registration, classification	
		Optimisation Methods	Olten	SS-1								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, polymer synthesis, polymer characterization, biopolymer, polymer processing
		Polymers and Applications	Fribourg	AS-B3									
		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
		Industrial Chemical Process Safety	Fribourg	SS-B2									process safety in the chemical industry, case studies
	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
		Bioanalytics in a regulated Environment	MuttENZ	AS-B3									concept of specification, development phases of a test methods, monographs for biopharmaceuticals,
		Regulatory Affairs	Sion	SS-B1									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						
	Life Cycle Assessment		Bern	AS-2									seminal examples of LCA, use and misuse of LCA, environmental management methods, steps of an LCA procedure
	Sustainable Development 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	Journal Club "Food and Nutrition Sciences"	Bern	AS-1	Thursday							Scientific publishing, reading and presenting selected publications, discussion and wrap-up of groups of related publications		
	Progresses in Food Processing	Olten	AS-B1/2									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	

for each specialisation you have to choose a minimum number of modules from the compulsory elective modules, depicted in dark green

choose at least three modules (preferably from your cluster)

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, 18.06.2021, Georg Lipps