Module	**Analytical Technologies**
Code	MSLS_V3_4
Degree Programme	Master of Science in Life Sciences (MSLS)
ECTS Credits	4
Workload	Total 120 h: Contact 60 h; Self-study 60 h
Module Coordinator	**Name** Prof. Dr. Chahan Yeretzian **Phone** +41 (0)58 934 55 26 **Email** chahan.yeretzian@zhaw.ch **Address** ZHAW Zürcher Hochschule für Angewandte Wissenschaften Life Sciences and Facility Management Campus Reidbach; RT 317 Postfach CH-8820 Wädenswil x The coordinator is also a lecturer
Lecturers	• Dr. Ivana Kroslakova • Dr. Sebastian Opitz • Dr. Samo Smrke • Roland Josuran • Prof. Dr. Jürgen Stohner • Guest lecturers & external experts
Entry Requirements	• Understanding of analytical chemistry from Bachelor of Science in Life Sciences/ Chemistry • Basics in mathematics and statistics • Basics in analytical biology
Learning Outcomes and Competences	After completing the module students • will have an understanding of the basic components of Mass Spectrometry, Liquid Chromatography, Data Analysis & Chemometrics, Analytical Chemistry related to Forensics and Microarrays with selected applications in the Life Sciences. • are capable of reading, analysing and critically discussing English written publications dealing with applications in the above-mentioned fields. It provides advanced knowledge in: • Key analytical technologies for volatile and non-volatile bio-analytics, more specifically in, mass-spectrometry, on-line volatile analysis (PTR-MS), bio-analytics (MALDI-ToF-MS) and various MS-coupled liquid chromatography technologies, in conjunction with applications. • data analysis of complex and large datasets

	• know the molecular and technological principles of Bioarrays, their potentials and limitations and the pros and cons of known transducers. Furthermore, the course will provide an overview of array technologies for bio-analytics, drug-screening and diagnostics. • Techniques for collecting good data • Techniques for extracting information from multivariant data
Module Content	The module introduces and deepens the theoretical and practical understand and competencies in key area of mass spectrometry-based analytical technologies. This includes a range of state-of-the-art technologies like PTR-ToF-MS, MALDI-ToF-MS, LC(MS)n and bioarrays. Furthermore, chemometric techniques for analysis of large and complex datasets will be introduced and applications will be discussed. Finally, advanced techniques and practices in process analysis and quality assurance will be introduced. More specifically this includes the following subjects: Critical discussion of the basic elements of Mass Spectrometry, including: (i) Ionization Sources & Ionization Schemes; (ii) Mass Analysers (Quadrupole MS, TOF); (iii) Detectors and understanding of a series of selected MS based methods important for the Life Sciences, such as: • MALDI Time-of-Flight Mass Spectrometry and applications to Proteins and Peptides • Chemical Ionisation Mass Spectrometry and its applications to Food Technologies and Flavour Sciences Liquid Chromatography technologies coupled to mass spectrometry: technologies and applications will be highlighted. Microarray is a key technology for analysing gene expression. It allows exploring fundamental aspects of growth and development and the underlying genetic causes of many human diseases. See http://www.ncbi.nih.gov/About/primer/microarrays.html for more information on Microarrays. This course will provide a basic understanding of the technology and its major applications in the biomedical sciences. Chemometrics is a chemical discipline that uses mathematical and statistical methods (a) to design or select optimal experimental procedures; (b) to provide maximum relevant chemical information by analysing chemical data; and (c) to obtain knowledge about chemical systems. Fundamentals on univariate least-squares regression, multivariate least squares regression (classical and principal component). Analytical chemistry is also an integral part of forensic sciences. The students gain knowledge about current analytical technologies in this special field of interest by studying examples from selected topics.
Teaching / Learning Methods	• lectures • short seminars • presentations • case studies • exercises

	• practical experimentations in laboratory • demonstrations and self-study Pre-readings will be sent by email for preparation prior to lecture.
Assessment of Learning Outcome	Each course will be assessed by a final written examination. Details will be communicated during the module and respective courses. The final grade is the un-weighted average of the grades of the five individual course marks.
Bibliography	Review papers and selected application papers in English (will be distributed during the individual courses). The pre-reading and pre-study of these papers is compulsory, and the lectures will build and be based on these reading materials.
Language	Mainly German, some lectures will be in English
Comments	
Last Update	18.04.2023