



Module	Analytcs and Characterization
Code	MLS_S22
Degree Program	Master of Science in Life Sciences (MSLS)
Cluster	Chemistry
Specialization	Chemical Development and Production
ECTS Credits	4
Workload	120 h: Contact 56 lessons = 42 h; Self-study 78 h
Module Coordinator	<p>Name Cyril Portmann</p> <p>Phone +41 (0)26 429 67 76</p> <p>Email cyril.portmann@hefr.ch</p> <p>Address Haute école d'ingénierie et d'architecture de Fribourg, Bd de Pérolles 80, CH-1700 Fribourg</p>
Lecturers	<ul style="list-style-type: none"> • Cyril Portmann (HEIA-FR) • Olivier Nicolet (HEIA-FR) • Pierre Brodard (HEIA-FR) • Lucarini Fiorella (HEIA-FR) • External experts • Guest lecturers
Entry Requirements	Bachelor of Science in Chemistry or in a related course of study including basic knowledge in analytical and physical chemistry.
Learning Outcomes and Competences	<p>After completing the module students will be able to:</p> <ul style="list-style-type: none"> • Understand and explain time-resolved spectroscopic methods used to measure ultrafast kinetics • Understand and explain high-resolution methods used to image solids and surfaces at the atomic-scale • Understand and explain physical chemistry methods applied to industrial domains • Understand and explain the particles size characterization techniques and their outputs • Understand and apply the validation of method in the frame of accredited laboratory. • Understand analytical laboratory accreditation process • Understand and apply NMR spectroscopy to conduct quantitative analyses. • Understand and explain principle and applications of immunoassays • Understand state of the art analytical techniques applied to the field of natural product chemistry • Elaborate analytical method from sampling to publication of results

	<ul style="list-style-type: none"> • Understand and apply sample preparation techniques for environmental matrices • Understand passive sampling techniques in environmental monitoring • Understand analytical methods and sample preparation techniques for the analysis of contaminants in food
Module Content	<p>Advanced methods of physical characterization:</p> <ul style="list-style-type: none"> • nanosecond fluorescence decay by time-correlated spectroscopy • picosecond/femtosecond kinetics by pump-probe methods (transient absorption, transient grating, fluorescence up-conversion) • atomic-scale topography by scanning probe methods <p>Quantitative NMR (qNMR)</p> <p>Immunoassays</p> <ul style="list-style-type: none"> • ELISA, Electrochemiluminescence, Western Blot, Lateral Flow Assay • Validation of immunoassays • Applications of Immunoassays <p>Advances analytical techniques in natural product chemistry</p> <p>Particles size distribution characterization</p> <p>Sample preparation techniques in analytical chemistry</p> <p>Applied environmental analysis</p> <p>Analysis of chemical contaminants in food</p> <p>Analytical method validation</p> <p>ISO17025, ISO17034</p>
Teaching / Learning Methods	<ul style="list-style-type: none"> • Lectures • Individual and group exercises • Active participation in the module is requested
Assessment of Learning Outcome	<ul style="list-style-type: none"> • Final examination (oral): 100 % of the final grade • Reassessment: oral exam
Bibliography	<ul style="list-style-type: none"> • Literature and regulatory guidelines will be provided during lectures.
Language	English
Comments	-
Last Update	<p>05.06.2018 / M. Dabros & R. Marti</p> <p>29.03.2019 / J.-P. Bourgeois</p> <p>22.01.2020 / J.-P. Bourgeois</p> <p>22.05.2020 / J.-P. Bourgeois</p> <p>21.06.2021 / COPIL MLS</p> <p>22.11.2022 / C. Portmann</p>