



Module	Analytics 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 Dr. J.-P. Bourgeois</p> <p>Phone +41 (0)26 429 67 15</p> <p>Email jean-pascal.bourgeois@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"> • Olivier Vorlet (HEIA-FR) • Olivier Nicolet (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 • Explain and apply the ideas proposed by the Process Analytical Technologies (PAT) initiative • Understand and apply the validation of method in the frame of accredited laboratory. • Understand state of the art analytical instrumentations • Elaborate analytical method from sampling to publication of results
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>On-line / at-line Infrared Spectroscopy Process Analytical Technologies (PAT) Process capability analysis</p>

	Packaging tightness characterization Particles size distribution characterization State of the art in analytical methods Applied environmental analysis Analytical method validation
Teaching / Learning Methods	<ul style="list-style-type: none"> • Lectures • Individual and group exercises • Field trip and laboratories visit (mandatory) • 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	14.10.2016 / O. Nicolet 08.03.2017 / O. Nicolet 02.03.2018 / J.-P. Bourgeois 05.06.2018 / M. Dabros & R. Marti