Module	**Fermented Beverages Technology, Chemistry and Microbiology**
Code	MSLS_S15
Degree Program	Master of Science in Life Sciences (MSLS)
ECTS Credits	4
Workload	120 h: Contact & Field work 75 lessons = 56 h; Self-study 64 h
Module Coordinator	**Name** Pr Dr Benoit BACH **Phone** +41 22 363 40 50 **Email** benoit.bach@changins.ch **Address** CHANGINS, Viticulture and Enology Route de Duillier 52, Case postale 1148, CH-1260 Nyon 1
Lecturers	• Pr Dr Benoit Bach, CHANGINS, Viticulture and Enology • Pr Dr Charles CHAPPUIS, CHANGINS, Viticulture and Enology • Guest lecturers
Entry Requirements	Equivalent of a Bachelor of Science in Chemistry, Biochemistry, Biology, or Enology Viticulture
Learning Outcomes and Competences	After completing the module students will be able to: • Apply the scientific method to solve specific problems related to fermented beverages • Identify key flavor compounds in alcoholic beverages and understand their production pathways, transformations, and interactions • Select and apply appropriate analytical and sensory methods to address quality-related challenges in alcoholic beverage production • Design and implement experimental setups to validate hypotheses • Interpret and discuss experimental results in a scientific context
Module Content	Fermented Beverage Production and Microbiology • Overview of fermented beverage production processes • Fundamentals of microbiology applied to fermented beverages • Microbiological methods in wine microbiology: PCR, flow cytometry, plating, and cell viability techniques • Yeast selection strategies and fermentation biotechnologies • Key parameters and control points in spontaneous and wild fermentations Analytical chemistry • Use of analytical chemistry to understand the biochemical transformations in fermented beverages • Qualitative and quantitative analysis using advanced instrumentations such as GC-FID, GC-MS, HPLC-DAD, LC-MS and spectroscopy (UV-VIS, FTIR, AES) • Sulfur compounds: perception, production and analysis

	• Quality control: quality characteristics (key-compounds of flavors active and macromolecules) critical control points during the process (microbiological and colloidal stability) • Contaminants (toxins, biogenic amines, NIAS…); incidence and strategies to reduce the risks. • Sensory analysis as a tool for product characterization and valorization • Data processing and statistical interpretation of analytical and sensory data
Teaching / Learning Methods	Laboratory sessions with hands-on practice in microbiology, fermentation control, and analytical chemistry Oral presentations to develop scientific communication skills Interactive workshops and case studies Interactive sessions with equipment and material suppliers (e.g., analytical instruments, oenological additives, microbiological kits) Group work and peer discussions to foster collaborative problem solving
Assessment of Learning Outcome	Oral presentations during semester : 50% of the final grade Written exam : 50% of the final grade Remediation: oral presentation
Bibliography	Paterson A., J. S. Swanston J. S., J. R. Piggott J. R., Andrew G. H. Lea, John R. Piggott (2003) Fermented Beverage Production Springer. Pires Eduardo José Brányik Tomáš (2015) Biochemistry of beer fermentation Springer Waterhouse A. L. and Ebeler S. E. (1998). Chemistry of Wine Flavor, Washington, D.C.:American Chemical Society, Moreno-Arribas M. V. and Carmen Polo M.. Wine Chemistry and Biochemistry, New York:Springer, 2009. Boulton, R.B., Singleton, V.L.; Bisson, L.F.; Kunkee, R.E. (1995) – Principles and Practices of Winemaking, Chapman & Hall, New York. Ribéreau-Gayon, P. ; Glories, Y. ; Maujean, A. ; Dubourdieu, D. (1998) – Traité d'Oenologie. 2. Chimie du Vin, Stabilisation et Traitements, Dunod, Paris. Andrea Buettner et al. (2017) *Handbook of odor*. Springer International Publishing Switzerland.
Language	French/English
Comments	The course will be supported by student self-directed study of scientific articles and laboratory work
Last Update	20.06.2025 / BB