



# Master in Life Sciences

A cooperation between  
BFH, FHNW, HES-SO, ZFH

<b>Module</b>	<b>Sustainable Biotechnology</b>
<b>Code</b>	MLS_S11
<b>Degree Program</b>	Master of Science in Life Sciences (MSLS)
<b>Cluster</b>	Bio/Pharma
<b>Specialization</b>	Applied Biosciences
<b>ECTS Credits</b>	4
<b>Workload</b>	120 h: Contact 56 lessons = 42 h; Self-study 78 h
<b>Module Coordinator</b>	<p><b>Name</b> Dr. Fabian Fischer</p> <p><b>Phone</b> +41 27 606 86 58</p> <p><b>Email</b> <a href="mailto:Fabian.Fischer@hevs.ch">Fabian.Fischer@hevs.ch</a></p> <p><b>Address</b> HES-SO Valais, Sion</p>
<b>Lecturers</b>	<ul style="list-style-type: none"> <li>• Fabian Fischer (HES-SO//Valais Wallis)</li> <li>• Bruno Schnyder (HES-SO//Valais Wallis)</li> <li>• Simon Crelier (HES-SO//Valais Wallis)</li> <li>• Manfred Zinn (HES-SO//Valais Wallis)</li> <li>• Hans-Peter Meyer (HES-SO//Valais Wallis)</li> </ul>
<b>Entry Requirements</b>	Bachelor of Science in Life Technologies (orientation Biotechnology or Analytical Chemistry) or in a related course of study (Bachelor level)
<b>Learning Outcomes and Competences</b>	<p>After completing the module students will be able to:</p> <p>To know what are renewables, biofuels, biopolymers, biorefining, chiral building blocks, and the knowledge in Industrial Biotransformation with emphasis on sustainability. An important aspect is the design of entire bioconversion processes based on literature data including the evaluation of the environmental feasibility.</p> <p>The student must be able:</p> <ul style="list-style-type: none"> <li>• Can analyse Industrial Biotechnology business cases and respond to content questions.</li> <li>• Gives examples and explanations for commercial biocatalysis projects, in which positional specificity, and stereo specificity and green aspects are very important.</li> <li>• Compares and contrasts processes that are realized with whole cells and free enzymes. Sees the advantages of immobilised biocatalysts.</li> <li>• Knows about most important advantages of biocatalysis and is capable to compare them with other production technologies such as chemistry.</li> <li>• Can identify some of the major problems that could cause problems for biocatalytic processes in view of sustainability.</li> <li>• Knows the steps to improve Biotransformations with whole cells using metabolomics and fluxomics.</li> <li>• Knows the value of patents; on the success of products generated by biocatalysis.</li> <li>• Can describe biorefinery concepts for given feedstocks.</li> <li>• Knows how to produce major biofuels and renewable materials.</li> <li>• Describes platform chemicals and their use.</li> </ul>

<p><b>Module Content</b></p>	<p><b>Sustainable Biotechnology</b></p> <ul style="list-style-type: none"> <li>• Economic and sustainable industrial production through Biotransformation</li> <li>• Bioconversion Technology</li> <li>• Whole cell use for bioconversions</li> <li>• Use of purified enzymes and other biomolecules in bioconversion</li> </ul> <p><b>Applied Sustainable Biotechnology</b></p> <ul style="list-style-type: none"> <li>• Biorefining</li> <li>• Renewables</li> <li>• Biofuels</li> <li>• Biopolymers</li> <li>• Phytobiotechnology</li> </ul>
<p><b>Teaching / Learning Methods</b></p>	<p>Lectures, seminar-style work, case studies and exercises. Active participation in the module is required</p>
<p><b>Assessment of Learning Outcome</b></p>	<p>The reports and presentations related to practical work or for seminars must be validated to gain access to the module exam. Written examination at the end of the semester. The grade of the module exam is the grade of the module. Remediation: Oral exam</p>
<p><b>Bibliography</b></p>	<ul style="list-style-type: none"> <li>• Kurt Faber, Biotransformations, Springer Verlag, Heidelberg, 2000.</li> <li>• Liese, K. Seelbach, C. Wandrey, Industrial Biotransformations, Wiley-VCH, Weinheim, 2000.</li> <li>• Hans E. Schoemaker, Daniel Mink, Marcel G. Wubbolts Dispelling the Myths- Biocatalysis in Industrial Synthesis Science 2003, 299, 1694-1697.</li> <li>• A. Schmid, J.S. Dordick, B. Hauser, A. Kiener, M. Wubbolts, B. Witholt Industrial Biocatalysis today and tomorrow Nature 2001, 409, 258-268.</li> <li>• Ralf Takors, Metabolic and Bioprocess Engineering – a Fruitful Symbiosis Schriften des Forschungszentrums Jülich Reihe Lebenswissenschaften / Life Sciences Band /Volume 23, 2005.</li> <li>• Martin Patel et al., Medium and Long-term Opportunities and Risks of Biotechnological Production of Bulk Chemicals form Renewable Resources- The Potential of White Biotechnology, 2006.</li> </ul>
<p><b>Language</b></p>	<p>English</p>
<p><b>Comments</b></p>	
<p><b>Last Update</b></p>	<p>08.05.2019 / Fabian Fischer</p>