

<b>Module</b>	<b>Genomics and genome analysis</b>
<b>Code</b>	MLS_S08
<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 = 42h; Self-study 78 h
<b>Module Coordinator</b>	<p><b>Name</b> Dr. Bruno Schnyder</p> <p><b>Phone</b> +41 27 606 8659</p> <p><b>Email</b> <a href="mailto:bruno.schnyder@hevs.ch">bruno.schnyder@hevs.ch</a></p> <p><b>Address</b> HES-SO Valais, Sion</p>
<b>Lecturers</b>	<ul style="list-style-type: none"> <li>• Dr. Sergio Schmid, HES-SO Valais, Sion</li> <li>• Dr. Bruno Schnyder, HES-SO Valais, Sion</li> <li>• Guest speakers (from industry)</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>The participants will acquire knowledge on gene functions and dysfunctions related to diseases, as well as in gene defects and the respective approaches and techniques of analysis.</p> <p>The student must be able to:</p> <ul style="list-style-type: none"> <li>• understand the gene structures and the related analysis</li> <li>• compare and evaluate different analytical systems for genes and genomes</li> <li>• search, read and apply scientific literature</li> </ul>
<b>Module Content</b>	<p><b>Principles of genetic information</b></p> <ul style="list-style-type: none"> <li>• in eukaryotic cells, in comparison with prokaryotic cells</li> <li>• on cell cycle, apoptosis</li> <li>• on oncogenes, tumor</li> </ul> <p><b>Cell signaling from transcription factors to gene expression</b></p> <ul style="list-style-type: none"> <li>• roles of the different signaling pathways</li> <li>• applications of transcription factors</li> </ul> <p><b>Gene analytics</b></p> <ul style="list-style-type: none"> <li>• Sanger's method of gene sequencing</li> <li>• next generation sequencing NGS</li> <li>• epigenetics analysis</li> <li>• genomics, transcriptome analysis on micro-chips</li> <li>• PCR versus classical histology analysis</li> <li>• "case-studies"</li> </ul>

	<p><b>Genetic diseases in human</b></p> <ul style="list-style-type: none"> <li>• genotype-related infectious diseases</li> <li>• and protection against the diseases in “individuals”</li> <li>• “case studies”</li> </ul> <p><b>Model organisms</b></p> <ul style="list-style-type: none"> <li>• gene-deficient ko mice</li> <li>• C.elegans nematodes, Drosophila fruit fly, Zebrafish</li> <li>• “case studies”</li> </ul> <p><b>Genomics of industrially relevant microorganisms</b></p> <ul style="list-style-type: none"> <li>• Basics of microbial genetics</li> <li>• Industrial applications</li> <li>• Emerging microbial systems</li> </ul> <p><b>Gene therapy of genetic diseases</b></p> <ul style="list-style-type: none"> <li>• The Sickle cell anaemia paradigm</li> </ul> <p><b>Mass spectrometry (MS) meets genomics</b></p> <ul style="list-style-type: none"> <li>• (invited lecture from industry)</li> </ul>
<p><b>Teaching / Learning Methods</b></p>	<ul style="list-style-type: none"> <li>• lectures in oral and written form</li> <li>• exercise trainings in groups</li> <li>• literature study of selected research publications</li> <li>• self-study, mainly following the lectures</li> <li>• active participation in the module is required</li> </ul>
<p><b>Assessment of Learning Outcome</b></p>	<p>The reports related to each practical work and case study, Journal Club must be validated to gain access to the exam.</p> <p>Written examination at the end of the semester. The grade of the exam is the grade of the course.</p> <p>Remediation : written examination</p>
<p><b>Bibliography</b></p>	<p>The lecturers’ documentations and scientific papers will be handed out.</p> <p>Key literature books include:</p> <ul style="list-style-type: none"> <li>• Molecular Biology of the Gene, 7th Edition, By James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick; Published by Benjamin Cummings (2014); ISBN-10: 0-321-76243-6 ; ISBN-13: 978-0-321-76243-6</li> <li>• Lewin’s Genes XI, Jones &amp; Bartlett Learning, Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick (2014), ISBN-13: 9781449659851</li> </ul>
<p><b>Language</b></p>	<p>English</p>
<p><b>Comments</b></p>	<p><a href="http://cyberlearn.hes-so.ch">http://cyberlearn.hes-so.ch</a> (requires a login)</p>
<p><b>Last Update</b></p>	<p>19.06.2020 / Bruno Schnyder and Sergio Schmid</p>