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| Module | Genomics and genome analysis |
| Code | MLS_S08 |
| Degree Program | Master of Science in Life Sciences (MSLS) |
| Cluster | Bio/Pharma |
| Specialization | Applied Biosciences |
| ECTS Credits | 4 |
| Workload | 120 h: Contact 56 lessons = 42h; Self-study 78 h |
| Module Coordinator | <p>Name Dr. Bruno Schnyder</p> <p>Phone +41 27 606 8659</p> <p>Email bruno.schnyder@hevs.ch</p> <p>Address HES-SO Valais, Sion</p> |
| Lecturers | <ul style="list-style-type: none"> • Dr. Sergio Schmid, HES-SO Valais, Sion • Dr. Bruno Schnyder, HES-SO Valais, Sion • Guest speakers (from industry) |
| Entry Requirements | Bachelor of Science in Life Technologies (orientation Biotechnology or Analytical Chemistry) or in a related course of study (Bachelor level) |
| Learning Outcomes and Competences | <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"> • understand the gene structures and the related analysis • compare and evaluate different analytical systems for genes and genomes • search, read and apply scientific literature |
| Module Content | <p>Principles of genetic information</p> <ul style="list-style-type: none"> • in eukaryotic cells, in comparison with prokaryotic cells • on cell cycle, apoptosis • on oncogenes, tumor <p>Cell signaling from transcription factors to gene expression</p> <ul style="list-style-type: none"> • roles of the different signaling pathways • applications of transcription factors <p>Gene analytics</p> <ul style="list-style-type: none"> • Sanger's method of gene sequencing • next generation sequencing NGS • epigenetics analysis • genomics, transcriptome analysis on micro-chips • PCR versus classical histology analysis • "case-studies" <p>Genetic diseases in human</p> <ul style="list-style-type: none"> • genotype-related infectious diseases • and protection against the diseases in "individuals" • "case studies" |

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| | <p>Model organisms</p> <ul style="list-style-type: none"> • gene-deficient ko mice • C.elegans nematodes, Drosophila fruit fly, Zebrafish • “case studies” <p>Genomics of industrially relevant microorganisms</p> <ul style="list-style-type: none"> • Basics of microbial genetics • Industrial applications • Emerging microbial systems <p>Gene therapy of genetic diseases</p> <ul style="list-style-type: none"> • The Sickle cell anaemia paradigm <p>Mass spectrometry (MS) meets genomics</p> <ul style="list-style-type: none"> • (invited lecture from industry) |
| <p>Teaching / Learning Methods</p> | <ul style="list-style-type: none"> • lectures in oral and written form • exercise trainings in groups • literature study of selected research publications • self-study, mainly following the lectures • active participation in the module is required |
| <p>Assessment of Learning Outcome</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>Bibliography</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"> • 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 • Lewin’s Genes XI, Jones & Bartlett Learning, Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick (2014), ISBN-13: 9781449659851 |
| <p>Language</p> | <p>English</p> |
| <p>Comments</p> | <p>http://cyberlearn.hes-so.ch (requires a login)</p> |
| <p>Last Update</p> | <p>08.05.2019 / Bruno Schnyder and Sergio Schmid</p> |