



Module	Safety, Production and Quality
Code	MLS_S05
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. Ennio Vanoli</p> <p>Phone +41 (0)26 429 67 08</p> <p>Email ennio.vanoli@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"> • Dr. Pierre Brodard, HEIA-FR • Laurent Donato, HEIA-FR • Olivier Vorlet, HEIA-FR
Entry Requirements	Bachelor of Science in Chemistry or in a related course of study including chemical production, physical chemistry and automation (Bachelor level)
Learning Outcomes and Competences	<p>The objectives are to study, to understand, and to apply production techniques including the corresponding thermal safety, automation and quality in a sustainable development vision.</p> <p>The student will be able to:</p> <ul style="list-style-type: none"> • List and evaluate the important processes of industrial chemistry • Assess a process in terms of costs, validation, planning and safety • Know the norms ISO 9001 and GMP • Application of standards to concrete case • Select industrial facilities most suitable for the development of an industrial process chemistry • Know the strength of equipment materials • Evaluate the thermal risk of a chemical process • Know the elements of a process risk analysis • Design an automated production
Mode Content	<p>Industrial processes</p> <ul style="list-style-type: none"> • Scale up of the processes • Establishment of an standard operating procedure (SOP) • Calculate the cost of products • Assessing the risk of a process (method HAZOP's) • Strength of materials utilized in chemical production

	<ul style="list-style-type: none"> • Cases Studies <p>Thermal safety</p> <ul style="list-style-type: none"> • Chemical thermodynamic • Reactions kinetics and dynamics • Thermal safety • Calorimetry, DSC • Risk analysis • Case studies <p>Process Automation</p> <ul style="list-style-type: none"> • Enterprise-control system integration (ISA S95) • Batch Control (ISA S88) • Safety Integrity Level (ISA S84) • Industry 4.0 • Case studies <p>Quality</p> <ul style="list-style-type: none"> • To know what means managing according to ISO 9001 • To be able to define managing and working processes • To know the importance of quality controls and tracking systems • To know the basics of GMP • To be able to use several tools to increase the quality, especially in production process
Teaching / Learning Methods	<ul style="list-style-type: none"> • Lectures • Individual and group exercises • 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"> • B. Martel, Aide mémoire de chimie organique industrielle, Dunod 1996 • K. Weissermel & H.-J. Arpe, chimie organique industrielle, De Boeck 2000 • K. Weissermel & H.-J. Arpe, Industrial Organic Chemistry, Wiley VCH 2008 • F. Stoessel, Thermal Safety of Chemical Processes: Risk Assessment and Process Design, Wiley-VCH 2008 • J. Steinbach, Safety Assessment for Chemical Processes, Wiley-VCH 1998 • D. W. Fleming, A. Pillai, S88 implementation guide: strategic automation for the process industries, McGraw Hill 1999 • J. Kletti, Manufacturing Execution System – MES, Springer 2007 • Total Quality Management, Shoji Shiba, Dunod • Fundamentals of Management, Stephen Robbins, David Decenzo, Mary Coulter, Pearson 2011 • How do I implement ISO 9001?, multi authored, ISO <p>Documentation: http://cyberlearn.hes-so.ch (requires a login)</p>
Language	English
Comments	
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