

<b>Module title</b>	<b>Industrial Chemical Process Safety</b>
<b>Code</b>	C6
<b>Degree Programme</b>	Master of Science in Life Sciences
<b>Group</b>	Chemistry
<b>Workload</b>	3 ECTS (90 student working hours: 32 h contact (= 42 lessons), 58 h self-study)
<b>Module Coordinator</b>	<p><b>Name:</b> Dr. Ludovic Gremaud  <b>Phone:</b> +41 26 429 68 06  <b>Email:</b> <a href="mailto:ludovic.gremaud@hefr.ch">ludovic.gremaud@hefr.ch</a>  <b>Address:</b> HEIA-FR, Chemistry Department, Bd. Pérolles 80, 1700 Fribourg</p>
<b>Lecturers</b>	<ul style="list-style-type: none"> <li>• Dr. Ludovic Gremaud, HEIA-FR</li> <li>• Dr. Véronique Breguet-Mercier, HEIA-FR</li> <li>• Dr. Pierre Brodard, HEIA-FR</li> <li>• Dr. Roger Marti, HEIA-FR</li> <li>• Dr. Andreas Zogg, FHNW</li> <li>• Guest lecturers, experts from the industry</li> </ul>
<b>Entry requirements</b>	<p>Chemistry at Bachelor of science level</p> <p><b>Knowledge requirement:</b></p> <ul style="list-style-type: none"> <li>• <i>Physical chemistry:</i> thermodynamics &amp; kinetics, thermal analysis (DSC), basic concepts of thermal safety (criticality classes)</li> <li>• <i>Industrial chemistry:</i> Industrial unit operation (filtration, distillation, drying...), process scale-up &amp; safety, EHS</li> </ul> <p><b>Way to support/encourage students to reach it:</b></p> <ul style="list-style-type: none"> <li>• Preparatory reading and exercises, including a self-test for students to check their actual understanding of the topics and to give them the opportunity to have the skills and knowledge to be ready for the summer school</li> </ul>
<b>Learning outcomes and competences</b>	<p><b>After completing the module, students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Appreciate how to give support to process development, operational excellence and manufacturing activities with DynoChem &amp; Reaction Lab tools as well as MATLAB</li> <li>• Understand the role and importance of safety valves within de production industries as well as the pathway to design it</li> <li>• Apprehend how to develop, interpret and apply EHS concept including compilation of regulatory relevant documents</li> <li>• Put into practice appropriate process safety tools as well as assess and explain results for process review</li> </ul>
<b>Module contents</b>	<ul style="list-style-type: none"> <li>• Understanding of the interconnected nature of process safety and design of production unit</li> <li>• Evaluate the thermal safety risk of various chemical processes, based on Case Studies</li> <li>• Concept and approach for green process development, operational excellence and engineering activities</li> <li>• Role and responsibilities towards Environmental, Health &amp; Safety legal right</li> <li>• Integration of specific requirements for Process R&amp;D &amp; Production activities in a HPAPI environment</li> </ul>

# Master in Life Sciences

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

<b>Teaching / learning methods</b>	<ul style="list-style-type: none"> <li>• Basic concepts and theoretical background by lecturers</li> <li>• Inputs by guest lectures from industry and academia</li> <li>• Exercises and analysis of case studies coming from the industries and academia</li> <li>• KiloLab &amp; Pilot Plan visits with hands demonstration and/or exercises</li> <li>• Questions &amp; Answers session (individual and group support)</li> </ul>																								
<b>Assessment of learning outcome</b>	<ol style="list-style-type: none"> <li>1. Entry exam prior the summer school, individual, open book (20%)</li> <li>2. Resolve case studies, individually and in group (3-4), open book (40%)</li> <li>3. Bibliographic report based on a scientific publication/chapter book, submission deadline 7 days after the summer school, groups of min. 2 people, open book (40%)</li> </ol>																								
<b>Format</b>	Summer school																								
<b>Timing of the module</b>	Spring semester, CW26 <table border="1" data-bbox="430 737 1339 877"> <thead> <tr> <th>Day of the block week</th> <th>&lt;1</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>&gt;5</th> </tr> </thead> <tbody> <tr> <td>Contact teaching (lessons)</td> <td></td> <td>8</td> <td>9</td> <td>8</td> <td>9</td> <td>8</td> <td></td> </tr> <tr> <td>Self-study (hours)</td> <td>24</td> <td>3</td> <td>2</td> <td>3</td> <td>2</td> <td>0</td> <td>24</td> </tr> </tbody> </table>	Day of the block week	<1	1	2	3	4	5	>5	Contact teaching (lessons)		8	9	8	9	8		Self-study (hours)	24	3	2	3	2	0	24
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Self-study (hours)	24	3	2	3	2	0	24																		
<b>Venue</b>	Fribourg, HEIA-FR																								
<b>Bibliography</b>	<ul style="list-style-type: none"> <li>• Ullmann's Encyclopedia of Industrial Chemistry. DOI: 10.1002/14356007</li> <li>• Dynochem Resources. Locate to: <a href="https://www.scale-up.com/">https://www.scale-up.com/</a></li> <li>• Techniques de l'ingénieur. Locate to: <a href="https://www.techniques-ingenieur.fr/">https://www.techniques-ingenieur.fr/</a></li> <li>• Ignatowiz, E. (1997). Chemietechnik. Haan-Gruiten: Verlag Europa-Lehrmittel</li> <li>• Stoessel, F. (2008). Thermal Safety of Chemical Processes. Weinheim: WILEY-VCH</li> <li>• Legal texts regarding chemistry (chapter 813). Locate to: <a href="https://www.admin.ch/opc/fr/classified-compilation/81.html">https://www.admin.ch/opc/fr/classified-compilation/81.html</a></li> </ul> <p>Lectures notes (PDF) and additional material (exercises) will be delivered in addition before and during the module.</p>																								
<b>Language</b>	English																								
<b>Links to other modules</b>	<b>Coordination with modules:</b> <ul style="list-style-type: none"> <li>• C4, Green Chemistry</li> <li>• C5, Chemistry and Energy</li> </ul>																								
<b>Comments</b>	-																								
<b>Last Update</b>	25.09.2020																								