Module title	**Polymers and Applications**
Code	C3
Degree Programme	Master of Science in Life Sciences
Group	Chemistry
Workload	3 ECTS (90 student working hours: 40 lessons contact = 30 h; 60 h self-study)
Module Coordinator	**Name**: Prof. Pierre Brodard **Phone**: +41 (0)26 429 67 19 **Email**: pierre.brodard@hefr.ch **Address**: Haute école d'ingénierie et d'architecture Fribourg, Perolles 80, 1700 Fribourg
Lecturers	• Prof. Pierre Brodard, HEIA-FR • Prof. Roger Marti, HEIA-FR • Prof. Hans-Ulrich Siegenthaler, HEIA-FR • Prof. Stefan Hengsberger, iRAP Institute of Applied Plastics Research, HEIA-FR • Prof. Dominik Brühwiler, ZHAW • Guest lecturers & experts from industry
Entry requirements	Chemistry at Bachelor of Science level. Knowledge required in: Organic chemistry (reactivity of carbonyl and carboxylic acid derivatives, radical reactions) & Analytical and physical chemistry (spectroscopy, thermal analysis, chromatographic methods). Preparatory reading will be made available on Moodle. **See also information under "comments"**
Learning outcomes and competences	After completing the module, students will be able to: • design and execute typical synthetic methods for the preparation of polymers • select appropriate analytical and physico-chemical methods to characterize polymers • work with inorganic polymers and biopolymers and use them for applications • explain polymer processing and industrial application of polymers
Module contents	Synthesis of polymers (Chain-growth and step-growth polymerization) Chemical Post-Polymerization Modifications Characterization of polymers Biopolymers ("Bio"-Plastics & Biodegradable Polymers, Polysaccharides, Chemical synthesis of biomacromolecules) Environmental impact of plastics Inorganic & electronic polymers Polymers processing Industrial applications
Teaching / learning methods	• Basic concepts and theoretical backgrounds by lecturers • Inputs by guest lecturers from industry and academia • Exercises and analysis of case studies • Lab visits with hands-on demonstration

<table>
<tr><td>Assessment of learning outcome</td><td>1. Written exam (closed book), final (100%)</td></tr>
<tr><td>Format</td><td>Winter school</td></tr>
<tr><td>Timing of the module</td><td>Autumn semester, CW6

<table>
<tr><th>Day of the block week</th><th><1</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>>5</th></tr>
<tr><td>Contact teaching (lessons)</td><td></td><td>8</td><td>8</td><td>8</td><td>8</td><td>8</td><td></td></tr>
<tr><td>Self-study (hours)</td><td>20</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>30</td></tr>
</table></td></tr>
<tr><td>Venue</td><td>Fribourg</td></tr>
<tr><td>Bibliography</td><td>Course based on:
Chada & Roy: "Industrial Polymers, Specialty Polymers, and their Applications" CRC Press 2009
Carraher: "Introduction to Polymer Chemistry” CRC Press 2011
Campbell, Pethrick & White: "Polymer Characterization: physical techniques" CRC Taylor & Francis 2000
Mark, Allcock & West: "Inorganic Polymers" Oxford University Press 2005

Lectures notes (PDF) and additional material (exercises) will be delivered in addition during the module.</td></tr>
<tr><td>Language</td><td>English</td></tr>
<tr><td>Links to other modules</td><td>Coordination with modules C1 “Materials Science”, C2 “Surface Characterisation”, C4 “Green Chemistry” and C5 “Chemistry and Energy”.</td></tr>
<tr><td>Comments</td><td>There is a participant limit in this module. Registrations will be considered as follows:
1. Students for whom C3 is a compulsory module
2. Students from the Chemistry-Cluster
3. Students who need the ECTS for the graduation in the semester concerned
4. The remaining places will be drawn by lot

Whether participation is possible will be communicated by the end of week 37.</td></tr>
<tr><td>Last Update</td><td>28.02.2024</td></tr>
</table>