

Module title	Polymers and Applications
Code	C3
Degree Programme	Master of Science in Life Sciences
Group	Chemistry
Workload	3 ECTS (90 student working hours: 42 lessons contact = 32 h; 58 h self-study)
Module Coordinator	<p>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</p>
Lecturers	<ul style="list-style-type: none"> • Prof. Pierre Brodard, HEIA-FR • Prof. Roger Marti, HEIA-FR • Prof. Hans-Ulrich Siegenthaler, HEIA-FR • Prof. Bruno Bürgisser, HEIA-FR/iRAP Institute of Applied Plastics Research • Prof. Dominik Brühwiler, ZHAW • Guest lecturers & experts from industry
Entry requirements	<p>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, including a self-test on Moodle for students to check their actual understanding of the topic.</p> <p>See also information under “comments”</p>
Learning outcomes and competences	<p>After completing the module, students will be able to:</p> <ul style="list-style-type: none"> • 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	<p>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</p>
Teaching / learning methods	<ul style="list-style-type: none"> • 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 • Questions & Answers (Q&A) session (individual support)

Master in Life Sciences

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

Assessment of learning outcome	1. Written exam (closed books), final (100%)							
Format	Winter school							
Timing of the module	Autumn semester, CW6							
	Day of the block week	<1	1	2	3	4	5	>5
	Contact teaching (lessons)		8	9	9	8	8	
	Self-study (hours)	18	2	2	2	2	2	30
Venue	Fribourg							
Bibliography	<p>Course based on:</p> <p>Chada & Roy: "Industrial Polymers, Specialty Polymers, and their Applications" CRC Press 2009</p> <p>Carràher: "Introduction to Polymer Chemistry" CRC Press 2011</p> <p>Campbell, Pethrick & White: "Polymer Characterization: physical techniques" CRC Taylor & Francis 2000</p> <p>Mark, Allcock & West: "Inorganic Polymers" Oxford University Press 2005</p> <p>Lectures notes (PDF) and additional material (exercises) will be delivered in addition during the module.</p>							
Language	English							
Links to other modules	Coordination with modules C1 "Materials Science", C2 "Surface Characterisation", C4 "Green Chemistry" and C5 "Chemistry and Energy".							
Comments	<p>There is a participant limit in this module. Registrations will be considered as follows:</p> <ol style="list-style-type: none"> 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 <p>Whether participation is possible will be communicated by the end of week 37.</p>							
Last Update	23.03.2022							