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. Roger Marti **Phone**: +41 (0)26 429 67 03 **Email**: roger.marti@hefr.ch **Address**: Haute école d'ingénierie et d'architecture Fribourg, Perolles 80, 1700 Fribourg
Lecturers	• Prof. Olivier Nicolet, HEIA-FR • Prof. Roger Marti, HEIA-FR • Prof. Hans-Ulrich Siegenthaler, 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 analyze and 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 and "Bio"-Plastics 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
Assessment of learning outcome	1. Written exam (closed book), 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	8	8	8	8	
	Self-study (hours)	20	2	2	2	2	2	30

Venue	Fribourg
Bibliography	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.
Language	English
Links to other modules	Coordination with modules C1 "Materials Science", C2 "Surface Characterisation", C4 "Green Chemistry" and C5 "Chemistry and Energy".
Comments	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.
Last Update	20.02.2025