

MSE-437

**Polymer chemistry and macromolecular engineering**

Klok Harm-Anton

| Cursus                            | Sem.     | Type |
|-----------------------------------|----------|------|
| Chimiste                          | MA1, MA3 | Opt. |
| Ing.-chim.                        | MA1, MA3 | Opt. |
| Materials Science and Engineering | MA1, MA3 | Opt. |

|                            |                     |
|----------------------------|---------------------|
| Language of teaching       | English             |
| Credits                    | 3                   |
| Session                    | Winter              |
| Semester                   | Fall                |
| Exam                       | During the semester |
| Workload                   | 90h                 |
| Weeks                      | 14                  |
| <b>Hours</b>               | <b>3 weekly</b>     |
| Courses                    | 2 weekly            |
| Exercises                  | 1 weekly            |
| <b>Number of positions</b> |                     |

**Summary**

Know modern methods of polymer synthesis. Understand how parameters, which determine polymer structure and properties, such as molecular weight, molecular weight distribution, topology, microstructure can be controlled by proper choice of polymerization method and optimization of reaction condition

**Content**

- Introduction: Polymer structure, molecular weight and properties
- Step polymerization
- Radical chain polymerization (free radical polymerization, controlled radical polymerization)
- Emulsion polymerization
- Ionic chain polymerization (anionic and cationic polymerization)
- Chain copolymerization
- Ring-opening polymerization

**Keywords**

Polymer chemistry  
chain polymerization  
step polymerization

**Learning Prerequisites****Recommended courses**

General chemistry, Inorganic chemistry, Organic and polymer chemistry

**Learning Outcomes**

By the end of the course, the student must be able to:

- Discuss the main types of polymerization techniques
- Propose synthetic strategies to prepare specific synthetic polymers
- Specify the influence of key reaction parameters on polymer properties

**Transversal skills**

- Assess progress against the plan, and adapt the plan as appropriate.
- Make an oral presentation.
- Write a scientific or technical report.

### **Assessment methods**

Continuous assessment

### **Resources**

#### **Ressources en bibliothèque**

- [Principles of polymerization / Odian](#)
- [Polymer Chemistry / Lodge](#)

#### **Moodle Link**

- <https://go.epfl.ch/MSE-437>