

MSE-211

**Organic chemistry**

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Cursus	Sem.	Type
Materials Science and Engineering	BA3	Obl.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
<b>Hours</b>	<b>5 weekly</b>
Courses	2 weekly
Exercises	1 weekly
TP	2 weekly
<b>Number of positions</b>	

**Summary**

This course provides a basic foundation in organic chemistry and polymer chemistry, including chemical nomenclature of organic compounds and polymers, an understanding of chemical structures, chemical reaction mechanisms, as well as methods of organic and polymer synthesis.

**Content****Part I: Organic Chemistry**

1. The nature of the covalent bond
2. Molecular structure
3. Nomenclature of organic compounds
4. Mechanisms of organic reactions
5. Selected classes of organic compounds

**Part II: Macromolecular Chemistry**

1. Basics of macromolecular chemistry and polymer science
2. Step-growth polymerizations
3. Chain-growth polymerizations
4. Living and controlled polymerizations
5. Selected classes of polymers

**Keywords**

covalent bond, organic compounds, nomenclature, isomerism, substitution reactions, addition reactions, elimination reactions, molecular weight, thermoplasts, elastomers, fibers, polycondensation reactions, polyaddition reactions, chain polymerization reactions, living polymerizations, polyolefins, polymethacrylates, polyesters, polyamides, polycarbonates, polyurethanes

**Learning Prerequisites****Required courses**

General Chemistry

**Recommended courses**

General Chemistry

**Important concepts to start the course**

A notion of atoms and molecules

A notion of basic thermodynamics

### Learning Outcomes

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

- Describe the formation of covalent bonds, molecular structures (organic compounds, polymers)
- Draw molecular orbital diagrams, molecular structures (organic compounds, polymers)
- Compare covalent bonds, molecular structures, isomers
- Formulate reactions (organic synthesis, polymers)
- Decide between reaction mechanisms (organic synthesis, polymerisations)
- Derive compound names from molecular structures and vice versa
- Discriminate reaction mechanisms (organic synthesis, polymers)
- Propose polymerization methods

### Transversal skills

- Communicate effectively, being understood, including across different languages and cultures.
- Use a work methodology appropriate to the task.

### Teaching methods

ex cathedra, slides and blackboard, interactive exercises

### Expected student activities

attendance to lectures

active participation in lectures (questions, feedback)

solving the exercise sheets (at home)

active participation in exercises (demonstrating solutions on blackboard)

complementing course work with organic and polymer chemistry textbook (at home)

### Assessment methods

Written examination

### Resources

#### Moodle Link

- <https://go.epfl.ch/MSE-211>

### Prerequisite for

All courses related to chemistry and polymer science