

MSE-463

**Recycling of materials**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Energy Management and Sustainability	MA2, MA4	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.
Materials Science and Engineering	MA2, MA4	Opt.
Minor in Integrated Design, Architecture and Sustainability	E	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	During the semester
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Courses	2 weekly
<b>Number of positions</b>	

**Summary**

Students understand the issues and key factors of a waste recycling process. They know the sorting and recycling technologies of various materials and are able to compare the environmental impact of recycling with that of using raw material resources.

**Content**

- Why recycle: substitution effects
- Vital recycling chain
- Principles of recycling processes
- Recycling of metals
- Recycling of concrete
- Recycling of polymers and composites
- Recycling of paper and glass
- Recycling of WEEE
- Incineration and energy recovery
- Environmental impact and economics of recycling

**Learning Outcomes**

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

- Design a recycling process to recover materials from waste
- Explain the technical challenges to recycle plastics, composites, metals, etc.
- Compute Calculate the environmental impact of recycling and of raw material extraction
- Describe the calculation of the cost of waste treatment
- Assess / Evaluate recycling in an industrial environment

**Transversal skills**

- Set objectives and design an action plan to reach those objectives.
- Use a work methodology appropriate to the task.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.

- Take responsibility for environmental impacts of her/ his actions and decisions.
- Access and evaluate appropriate sources of information.
- Write a scientific or technical report.
- Make an oral presentation.

### Teaching methods

Seminars and discussions, visits of companies and recycling sites

### Expected student activities

- Participation to the course, seminars and visits
- Group project on a selected topic (recycling of silicon from solar modules, recycling of textiles ...)

### Assessment methods

The examination is in the form of a group project, which is evaluated with a "1 slide" oral presentation in english in the class and a written report in english. The final grade is the average of the following 5 grades :

1. Quality of the report (spelling, quality of the figures)
2. Bibliography (relevance of the information; all sources MUST be cited!)
3. Case study (data quality and novelty)
4. Synthesis and conclusions of the project
5. Quality of the 1-slide presentation (clarity, content and timing)

### Resources

#### Notes/Handbook

Copy of the course presentations

#### Moodle Link

- <http://moodle.epfl.ch/course/view.php?id=14904>