MSE-463

Recycling of materials

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Cursus	Sem.	Type
Energy Science and Technology	MA2, MA4	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.
Materials Science and Engineering	MA2, MA4	Opt.
Mechanical engineering	MA2, MA4	Opt.
Minor in Engineering for sustainability	E	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
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

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, that has to be submitted at last, Friday of the first week after the end of the teachings.
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

- https://go.epfl.ch/MSE-463