Recycling of materials

Leterrier Yves

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<thead>
<tr>
<th>Cursus</th>
<th>Sem.</th>
<th>Type</th>
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<td>Energy Science and Technology</td>
<td>MA2, MA4</td>
<td>Opt.</td>
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<td>Environmental Sciences and Engineering</td>
<td>MA2, MA4</td>
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<td>Materials Science and Engineering</td>
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<td>Mechanical engineering</td>
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<td>Minor in Engineering for sustainability</td>
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Language of teaching: English
Credits: 2
Session: Summer
Semester: Spring
Exam: During the semester
Workload: 60h
Weeks: 14
Hours: 2 weekly
Lecture: 2 weekly

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