**Cursus**

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<th>Energie et durabilité</th>
<th>Sem.</th>
<th>Type</th>
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<td>Mineur STAS Chine</td>
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<tr>
<td>Mineur en Technologies spatiales</td>
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<td>Science et génie des matériaux</td>
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**Remarque**

4h lecture every two weeks, from the first week.

**Summary**

Propose suitable materials, design, and production routes depending on different performance criteria using a computer based software approach. The course is based on Prof. Mike Ashby’s well known "Ashby plots" comparing different material properties (mechanical, thermal, chemical, etc.).

**Content**

- General introduction and presentation of the methodology
- Design and manufacturing of “new” materials and material combinations with desired attributes
- Illustration of the approach based on practical case studies; the examples range from structural & functional bulk materials, thin & thick film coatings, and composites down to complex systems like music instruments
- Exercises

**Keywords**

Materials evaluation, production processes evaluation, economical and ecological considerations case studies

**Learning Prerequisites**

**Required courses**

Basics in materials & mechanical engineering

**Recommended courses**

Engineering Design

**Learning Outcomes**

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

- Propose the best material for a specific application.
- Work out / Determine materials constraints and free variables.
• Derive indices of goodness (mechanical, thermal, ecological...).
• Create and defend a selection strategy respecting multiple objectives.
• Assess / Evaluate production methods with respect to economical and ecological aspects.

Transversal skills
• Use a work methodology appropriate to the task.
• Use both general and domain specific IT resources and tools
• Continue to work through difficulties or initial failure to find optimal solutions.
• Take responsibility for environmental impacts of her/ his actions and decisions.
• Set objectives and design an action plan to reach those objectives.
• Access and evaluate appropriate sources of information.

Teaching methods
50% ex-cathedra, 50% cases studies, team work, exercises and discussion

Expected student activities
Attendance at lectures and solving of case studies

Assessment methods
Written exam

Resources

Bibliography

Ressources en bibliothèque
• Materials Selection in Mechanical Design / Ashby

Notes/Handbook
PDFs of the manuscript/slides will be distributed.