

# Materials Selection and Design

## General Information

### Number of ECTS Credits

3

### Module code

TSM\_MatSelDes

### Valid for academic year

2020-2021

### Last modification

2018-11-05

### Responsible of module

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### Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Berne	Lausanne	Lugano	Zurich
<b>Instruction</b>			X E 100%	
<b>Documentation</b>			X E 100%	
<b>Examination</b>			X E 100%	

### Module Category

TSM Technical scientific module

### Lessons

2 lecture periods and 1 tutorial period per week

## Entry level competences

### Prerequisites, previous knowledge

Fundamentals of Material Science

Mechanics of Materials

## Brief course description of module objectives and content

Materials offer immense opportunities for innovation. However, advance is possible only if a procedure exists for making a rational choice from the materials and a method of identifying ways to shape, join, and finish them.

The objective of this course is to develop a systematic procedure for selecting materials and processes, leading to the subset that best matches the requirements of a design. The structure gives rapid access to data and allows the user great freedom in exploring potential choices. The method is

implemented in the GRANTA CES EduPack software to provide greater flexibility: it enhances the learning experience and provides a solid grounding in many of the domains of expertise specified by the various professional engineering accreditation bodies (analysis of components, problem-solving, design and manufacturing , economic, societal and environmental impacts).

## Aims, content, methods

### Learning objectives and acquired competencies

Understand the importance of material property charts

Understand the method for material selection and design

Understand the concept of effective properties and their dependence on phase spatial arrangement in hybrid materials.

Learn the manufacturing techniques of hybrid materials.

### Contents of module with emphasis on teaching content

The course content will be focused on:

- Material property charts
- Material selection and design
- Examples of hybrid materials and their applications
- Hybrid materials processing

Development of an hybrid material

### Teaching and learning methods

Teaching: Ex cathedra teaching (theory),

Laboratory exercise with GRANTA CES EduPack.

Learning methods: Self study

### Literature

M. F. Ashby, "Materials Selection in Mechanical Design", Elsevier, 2011.

M. F. Ashby, H. Shercliff, D. Cebon, "Materials: engineering, science, processing and design", Butterworth-Heinemann, 2018.

## Assessment

### Certification requirements

Module does not use certification requirements

### Basic principle for exams

**As a rule, all the standard final exams for modules and also all repetition exams are to be in written form**

### Standard final exam for a module and written repetition exam

Kind of exam

written

Duration of exam

120 minutes

Permissible aids

No aids permitted

### Special case: Repetition exam as oral exam

Kind of exam

oral

Duration of exam

30 minutes

**Permissible aids**

No aids permitted