CES8AB MATERIALS ENGINEERING

CES8AB **Materials engineering**	**ECTS Credits:** **4** **Duration:** **36 hours**	**Semester:** **S8**

Person(s) in charge:

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Keywords:

Materials - Process - Material selection

Prerequisites: None

Goal: Integrate the concept of "Materials" in a engineering vision

Program and contents:

Objectives
Materials play a dual role in all technological fields. They are the bottleneck that limits results. But, they are also a source of development when they provide new properties or enhanced performances. Consequently, in technological management (transportation, information, energy, civil engineering and construction, health, the arts, sports and leisure), integrating “engineered materials” appropriately is complex, but is something that can not be ignored. The objectives of the course are:

- to give students the keys to understand “engineered materials” for all technologies
- to acquire the essential information on the choice and implementation of different materials
- to gain insight into the developments brought about by innovations in the field of materials.

Content - Program

First part: Generalities, introduction/review of basic phenomena, choice of materials

- General introduction to the Science and Engineering of Materials. Cross-disciplinary role of material for all technologies,
- Relations between structures, properties and processing,
- Micro-structural engineering. Review of the concepts of steady state (thermo-chemical) and kinetics (transport phenomena),
- Preparation and processing of materials for the mass market and advanced technologies,
- Structure materials (mechanical properties) and functional materials (electronic properties, magnetic, optics, thermal and their combinations),
- Economic optimization in choosing a material.

Second part: Industrial materials and their applications (invited conferences)

- Advanced materials (for automobile and aero-spatial transportation)
- Polymer materials for packaging
- Civil engineering materials
- Glass
- Adaptive or “intelligent” materials

Evaluations
2 reports on class work, 1 conference report, 1 final test (1 ½ hours) and class participation.

Abilities:

Levels	Description and operational vocabulary
Know	Materials classes and applications
Understand	Link between process - microstructure - properties
Apply	Basic concepts in the field of Materials Science and Engineering
Analyze	Mechanisms
Summarize	Technical solutions involving engineering materials
Evaluate	Critical and relevant understanding of conferences dedicated to engineering materials

Evaluation:				
☑ Written test	☑ Continuous assessment	☐ Oral presentation	☐ Project	☑ Written report