



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Materials Selection

MATSCEN 4181

Credit Hours:

2.00

Course Levels:

Undergraduate (1000-5000 level)

Course Components:

Lecture

Course Description:

Systematic and quantitative strategies for selecting materials and processes as a foundation for designing with materials.

Prerequisites and Co-requisites:

Prereq: 2241, 2331, 2251, 2321, and enrollment as MatScEn-BS major; or permission of instructor.

Course Goals / Objectives:

- Learn how to select the best material to achieve a given performance or functionality from a large database
 - How to select materials by successive application of property limits and indices with multiple constraints and compound objectives
 - Learn relationships between processing, properties, structure, and performance of various materials
 - Learn about process design
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Course Topics:

- Design with Materials, Introductory case study
 - Materials data, databases and graphical representation of materials properties
 - Deriving material indices and basic materials selection
 - Checking and estimating materials data
 - Materials selection by successive application of property limits and indices
 - Materials Selection problems with multiple constraints and compound objectives. Penalty functions. Value functions
 - Selection of material and shape. Shape factors. Structural sections and mechanical efficiency. Material indices that include shape. Material limits for shape factors. Microscopic and microstructural shape factors
 - Materials processing and its influence on design, Process attributes, systematic process selection, Process selection diagrams, Process cost and cost modeling
 - Designing hybrid materials
 - Materials selection for sustainable and environmentally conscious design
 - Design Project Presentations
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Designation:

Required