CIVIL-443

Advanced composites in engineering structures

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Cursus	Sem.	Type
Civil Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Oral
Workload	90h
Weeks	14
Hours	**3 weekly**
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Summary

The objective of the course is to: 1. Introduce topics in properties, processing, mechanical behavior, characterization, analysis and structural design of Fiber Reinforced Composites 2. Help students develop their research skills through independent investigations on research topics.

Content

1. Introduction-Basic ideas about the use of composite materials, fibers, resins, applications.
2. Manufacturing of composite materials-composite components.
3. Basic mechanics of composites-Anisotropic theory of elasticity.
4. Mechanics of laminates.
5. Classical lamination theory.
6. Introduction to structural design.
7. Laboratory experience: Fabrication and testing of laminates.
8. Failure of FRP laminates.
9. Fatigue of composite materials.
10. Joints and joining techniques.

Keywords

Composites, engineering structures, mechanics of composites, laminates analysis.

Learning Prerequisites

Required courses

No obligation.

Recommended courses

Basic knowledge of physics, mechanics of materials, mathematics.

Learning Outcomes

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

- Analyze the behavior of composite structures.
- Design composite structures.
- Assess / Evaluate the strength of composite structures.
- Manage design projects.
- Express their opinion on design projects.

- Define needs and set priorities.
- Organize their work (especially when working in a team).
- Create complete technical reports.

Transversal skills

- Take feedback (critique) and respond in an appropriate manner.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Give feedback (critique) in an appropriate fashion.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Use both general and domain specific IT resources and tools
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Keep appropriate documentation for group meetings.
- Negotiate effectively within the group.

Teaching methods

Lectures will be given in the class assisted by powerpoint presentations.
Lecture notes will be distributed before each class.

Expected student activities

Class participation.
Homework (not obligatory).

Assessment methods

Project report and oral exam (based on project presentation).

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Bibliography

No textbook required

Notes/Handbook

Lecture notes are distributed.

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=9071