Mechanics of composites - BMEEOHSDT82

I. Subject Specification

1. Basic Data

1.1 Title

Mechanics of composites

1.2 Code

BMEEOHSDT82

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Kollár László
academic rank	Professor
email	kollar.laszlo@emk.bme.hu

1.8 Department

Department of Structural Engineering

1.9 Website

https://epito.bme.hu/BMEEOHSDT82
https://fiek2.mywire.org/course/view.php?id=2542

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

1.13 Effective date

2 February 2022

2. Objectives and learning outcomes

2.1 Objectives

Understanding the behavior of structures made of composite material. Importance of manufacturing, material properties, role of constituents. Why to use and not to use. Modelling of beams, plates and the simple structures. The most important assumptions of numerical solutions are introduced. Understanding failure of composites. See detailed topics.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. will learn the methods of structural design and calculation of composite structure
2. will learn the behaviour of composite structures,
3. will learn the typical behaviour of composite plates and beams
4. will learn the calculation of failure,
5. It is expected that students are capable to analyze a simple composite structure, and after learning a FE code, even a complex structure

B. Skills

1. The focus is on understanding, and on capability to apply the knowledge to new problems
2. see knowledge and topics,

C. Attitudes

1. cooperates with the lecturer and with fellow students,
2. is ready to apply numerical computational tools,
3. is intent on understanding the behaviour of composite structures,
4. is intent on problem solving,
5. is attending to the classes as a responsible member of the community.

D. Autonomy and Responsibility

1. is open to the new information,
2. is able to think in system.

2.3 Methods

Lectures and oral communications, hoping the active contribution of students

2.4 Course outline

Hét	Előadások és gyakorlatok témaköre
1.	Introductions: definition of composites, types, materials, why to use, typical examples, mayor differences compared to traditional building materials, manufacturing
2.	cont.
3.	Material law: anisotropic-, orthotropic- transversely isotropic-, isotropic materials, constrains on engineering constants
4.	cont.
5.	Micromechanics: rule of mixtures, improvements, Halpin-Tsai equation,
6.	cont.
7.	Macromechanics: theory of thin laminated plates, A-B-D matrices, special layups
8.	cont.
9.	Failure criteria: maximum stress and strain, quadratic (Tsai-Wu), composite plate with holes
10.	cont.
11.	Composite structures: plates, pressure vessel, composite beams (tension, bending, shear, torsion)
12.	cont.
13.	Stability analysis: plate buckling, column buckling, local buckling of thin walled beams
14.	cont.

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

- Kollár and Springer: Mechanics of Composite Structures, Cambridge University Press, 2004.

2.6 Other information

2.7 Consultation

This Subject Datasheet is valid for:

Inactive courses

Mechanics of composites - BMEEOHSDT82

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

3.2 Assessment methods

Teljesítményértékelés neve (típus)	Jele	Értékelt tanulási eredmények
		A.1-A.5; B.1-B.2; C.1-C.5; D.1-D.2

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Jele	Részarány
Összesen	**100%**

3.4 Requirements and validity of signature

3.5 Grading system

Érdemjegy	Pontszám (P)
jeles (5)	
jó (4)	
közepes (3)	
elégséges (2)	
elégtelen (1)	

3.6 Retake and repeat

3.7 Estimated workload

Tevékenység	Óra/félév
Összesen	

3.8 Effective date

2 February 2022

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Inactive courses