Fracture Mechanics - BMEEOTMDTV2

I. Subject Specification

1. Basic Data

1.1 Title

Fracture Mechanics

1.2 Code

BMEEOTMDTV2

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	Dr. Lakatos Éva
academic rank	Associate professor
email	lakatos.eva@emk.bme.hu

1.8 Department

Department of Structural Mechanics

1.9 Website

https://epito.bme.hu/BMEEOTMDTV2
https://edu.epito.bme.hu/course/view.php?id=2561

1.10 Language of instruction

english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

This lecture explains the basic (micro and macro) physical reasons of the different crack problems of the engineering structures, starting from the elastic and homogeneous situations until the plastic and/or nonhomogeneous (granular, reinforced) materials. It introduces the continuummechanical aspects of the numerical simulations and explains the different micromechanical and phenomenological modeling of crack problems. Very important part of the lecture is the numerical analysis of the crack behavior (application of the finite element solution) and the discussion of the fatigue effect for the crack propagation.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. General theoretical overview about the different versions of engineering crack models.
2. The knowledge of the applicability of these models in the engineering design processes.

B. Skills

1. The correct application of the fracture mechanical models in the different engineering problems,
2. The knowledge of the conditions of the application of models of the fracture mechanics.
3. The ability of the selection among the different crack propagation models.

C. Attitudes

1. Individually creates linear and nonlinear elastic, elasto-plastic and fracturing material models in case of practical fracture mechanical problems.

D. Autonomy and Responsibility

1. Endeavors to discover and routinely use the tools necessary to the problem solving of fracture mechanical modeling.
2. Endeavors to the precise and error-free problem solving for fracture mechanical problems.

2.3 Methods

Presentations and discussion of different scientific papers.

2.4 Course outline

Hét	Előadások és gyakorlatok témaköre
1.	**The basic principles and the history of fracture mechanics.**
2.	**The fracture and the internal microstructure of material.**
3.	**Stress functions for analysis of crack tops.**
4.	**Stress intensity factor.**
5.	**Application of energy methods for analysis of cracks.**
6.	**Analysis of cracks at elastic-plastic materials. Other methods.**
7.	**Laboratory experiments for determination of K, J and CTOD.**
8.	**Numerical methods in the fracture mechanics.**
9.	**Quasi-static strength analysis in the fracture mechanics. Special effects.**
10.	**Analysis of cyclic loading in fracture mechanics.**
11.	**Analysis of cracks in quasi-brittle (concrete, rock, etc.) materials.**
12.	**Analysis of fracture of wood structures.**
13.	Presentations of the students" state reports.
14.	Preparation for the oral exam.

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

- Bojtár: Fracture Mechanics. Lecture notes.
- Anderson: Fracture Mechanics. CRC Press.
- Miushelisvili: Some basic problems of the mathematical theory of the elasticity. Nordhoff Publishers.

2.6 Other information

2.7 Consultation

Consultations are possible in every periods of the semester.

This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

Oral exam.

3.2 Assessment methods

Teljesítményértékelés neve (típus)	Jele	Értékelt tanulási eredmények
Oral exam	1	A.1, A.2; B.1, B.2, B.3; C.1; 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
1	100
Összesen	**100%**

3.4 Requirements and validity of signature

A minimum presence of 70% is required to gain a signature.

3.5 Grading system

Érdemjegy	Pontszám (P)
jeles (5)	100-86
jó (4)	85-70
közepes (3)	69-60
elégséges (2)	59-50
elégtelen (1)	<50

3.6 Retake and repeat

A repetation is necessary **in case of a failed exam.**

3.7 Estimated workload

Tevékenység	Óra/félév
Individual work	40
Összesen	**40**

3.8 Effective date

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