

Tárgytematika / Course Description
Failure analysis**AJNM_ATTA003****Tárgyfelelős neve /****Teacher's name:** dr. Hargitai Hajnalka**Félév / Semester:** 2026/27/1**Beszámolási forma /****Assesment:** Vizsga**Tárgy heti óraszám /****Teaching hours(week):** 0/2/2**Tárgy féléves óraszám /****Teaching hours(sem.):****OKTATÁS CÉLJA / AIM OF THE COURSE**

Various vehicle and machinery parts can be damaged prematurely during use. Within the framework of the subject, the main goal is for students to learn about different damage processes, the behavior of materials under different stresses, and the steps of damage analysis. The subject comprehensively deals with modern quality control and material testing technologies of structural materials and material structures. In the MSc course, the subject serves to learn about the traditional tests used in industrial practice, the special modern material testing methods of defect analysis, and the most modern test procedures of research and development.

TANTÁRGY TARTALMA / DESCRIPTION

Damage analysis steps, possible material testing methods. Definition, types and brief description of damage and destruction.

The purpose, division and areas of activity of material testing. Error concept.

Mechanical tests. Tear test. Compression test, bending test. Hardness measurement.

Dynamic tests. Tests at low temperatures. The effect of state factors on the nature of the fracture. Examination of resistance to brittle fracture.

The phenomenon of fatigue. Fatigue tests.

Microscopic examinations, sampling, preparation, operation of metal microscopes, application, resolution.

Scanning electron microscope operation, SE, BSE mode, microprobe analysis.

Chemical composition determination by emission spectrum analysis

Heat treating. Examination and qualification of heat-treated parts.

Non-destructive tests.

Inspection and qualification of welded joints.

Case studies.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

The subject requirements for the current semester are announced during the first lecture and are available in the selearning system.

Conditions for obtaining a signature:

Active participation in classes and laboratory sessions.

Examination (requirement: obtaining a signature)

Oral exam based on pre-issued items (selearning system)

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Lecture Notes of Dr. Hajnalka Hargitai (in selearning system)

Scott MacKenzie, Houghton International, Inc.: Overview of the Mechanisms of Failure in Heat Treated Steel Components, Chapter 2 in Failure Analysis of Heat Treated Steel Components (#05113G), ASM International, 2008

Jose Luis Otegui: Failure analysis Fundamental and applications in mechanical components, Springer 2014

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL