

Tárgytematika / Course Description

Durability and fatigue in vehicle engineering

AJNM_JFTA010

Tárgyfelelős neve /

Teacher's name: dr. Vehovszky Balázs

Félév / Semester: 2022/23/1

Beszámolási forma /

Assesment: Folyamatos számonkérés

Tárgy heti óraszám /

Teaching hours(week): 2/2/0

Tárgy féléves óraszám /

Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

Introducing the state of the art theory and practice of structural durability calculations and testing techniques.

Lecturers: Tamás Fülöp and Benedek Szabó (Guest lecturers from the development department at Audi Hungaria Zrt.)

TANTÁRGY TARTALMA / DESCRIPTION

Detailed thematic description of the subject:

- Behavior of materials under cyclic loadings: crack initiation, crack propagation and fracture
- History of structural Durability
- Loading scenarios: Static, Dynamic and extreme loadings. Effect of temperature
- Analytical/Numerical methods for calculating stresses in structures
- Stress evaluation theories: local stresses, structural stresses and nominal stresses
- Fatigue of welded components
- Introduction of survival probability, the 50% S-N curve
- Low cycle fatigue, high cycle fatigue and endurance limit
- Statistical evaluation of the S-N curve
- Haigh Diagram, effect of mean stress
- Strain gauge measurements and testing techniques (application and hands-on experience is carried out during the practical part at Audi Hungaria)
- Data analysis and load distributions
- Counting schemes and algorithms, load collectives
- Durability assessment methods, Design to prevent fatigue
- Introduction of fatigue calculation tools
- Real-life examples within the framework of practices

Lectures are hold on each week, the practice part is hold on every second week. During the semester there will be one occasion (within the framework of practice, details are discussed during lecture) where we will visit the development department of Audi Hungaria, have a look on the testing facilities and we will learn how to break components professionally.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Two obligatory homeworks (30 + 30 points) **OR** one own topic for 60 points (e.g.: lifetime calculation of a component). The own topic must be consulted with the lecturers for approval at the beginning.

During the semester max 5 points can be scored with Quiz tests at the beginning of each lecture

Exam is obligatory, maximum point is 40. The final note will be determined as follows:

85 - 100 points:	excellent (5)
70 – 84 points	good (4)
55 – 69 points	satisfactory (3)
40 – 54 points	passed (2)
0 - 39 points:	fail (1)

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Stefan Einbock: Betriebsfestigkeit (*German*)

Stefan Einbock: Statistik (*German*)

Stefan Einbock: Statistics of Metal Fatigue in Engineering: Planning and Analysis of Metal Fatigue Tests (*English*)

Erwin Haibach: Betriebsfestigkeit: Verfahren und Daten zur Bauteilberechnung (*German*)

Jaap Schijve: Fatigue of Structures and Materials (*English*)

www.efatigue.com (*English*)

BME ATT: Fáradás és törés előadásjegyzet (*Hungarian*)