

## Tárgytematika / Course Description

### Durability and fatigue in vehicle engineering

AJNM\_JFTA010

Tárgyfelelős neve /

Teacher's name: dr. Vehovszky Balázs

Félév / Semester: 2021/22/1

Beszámolási forma /

Assesment: Folyamatos számonkérés

Tárgy heti óraszám /

Teaching hours(week): 2/2/0

Tárgy féléves óraszám /

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

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### 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.)*

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### 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

The practice part of the subject is referred as consultation time, **there will be no practice hold each week.** On

the other hand, during the semester there will be one block (date and time will be 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.

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## 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)

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## 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](http://www.efatigue.com) (*English*)

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