

Tárgytematika / Course Description

Vehicle Acoustics I.

AJNM_JFTA008

Tárgyfelelős neve /

Teacher's name: dr. Vehovszky Balázs

Félév / Semester: 2025/26/1

Beszámolási forma /

Assesment: Folyamatos számonkérés

Tárgy heti óraszám /

Teaching hours(week): 2/1/0

Tárgy féléves óraszám /

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

OKTATÁS CÉLJA / AIM OF THE COURSE

TANTÁRGY TARTALMA / DESCRIPTION

Vehicle acoustics I. - *general and engineering acoustics*

Lesson	Lecture (13 x 90 min)		Practice (6 x 90 min)
1.	Technical, professional introduction	Subject requirements, Vehicle acoustics and vehicle development introduction	
2.	General acoustics 1.	Physical basics, Characterization of sounds, Sound level - dB scale	
3.	General acoustics 2.	Acoustic wave phenomena, Perception of sounds, Noise damping, Basic acoustic measurements	Sound pressure/intensity/power measurements, microphone characteristics
4.	Vibration Theory 1.	Description of vibrations, 1 DOF systems - analytical solutions	
5.	Vibration Theory 2.	Multi-DOF systems, Resonance, Transfer function, Vibration damping basics	Acoustical calculations
6.	Vibrations of machines and parts 1.	<i>Vibrations of bearings, gears, engines, electric motors, balancing</i>	
7.	Vibrations of machines and parts 2.	<i>Order analysis, Campbell-diagram, condition monitoring of machines, vibration damping, acoustical insulation</i>	Vibration measurements - basics (accelerometers, spectrums, excitations, resonance)
8.	Measurements, signal processing 1.	<i>microphones and accelerometers: operating principles, types; NVH measurements: modal analysis, damping, sound insulation etc.</i>	

9.	Measurements, signal processing 2.	Measurement systems, analogue/digital signal processing, advanced measurements (intensity meter, acoustic imaging, directional array)	<i>Advanced vibration measurements (order analysis, modal analysis, vibration damping)</i>
10.	Environmental acoustics	Environmental acoustics - basics, terms, regulations	
11.	Acoustical simulations 1.	<i>Numerical simulation basics, Modal analysis, FEM - simulations and examples</i>	Environmental acoustics - measurements and simulations (Anett Bedő)
12.	Acoustical simulations 2.	MBS, BEM, SEA, Ray-tracing, DNA - simulations and examples	
13.	Site visit at G/GF-3	Acoustical applications and measurements at G13: Soundactor, Soundbrush, Semi-anechoic room, Acoustic camera, Car NVH measurement (inner noise), LSV, Frame stiffness measurement	

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL
