Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Tehniška akustika
Course title:	Technical Acoustics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program Predmetni učitelj 2. stopnje	**Izobraževalna tehnika**	**3**	**6**
Five-year master's degree program Subject teacher	**Technical education**	**3**	**6**

Vrsta predmeta / Course type	Izbirni / elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		**15**			**45**	**3**

Nosilec predmeta / Lecturer:	Aleš Belšak

Jeziki / Languages:	**Predavanja / Lectures:**	**slovenski / slovene**
	Vaje / Tutorial:	**slovenski / slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Ni pogojev.	No requirements.

Vsebina:

- Definicija zvoka v zraku, infrazvok, ultrazvok, akustična emisija;
- Akustika v zraku in kapljevini;
- Človeški sluh in percepcija zvoka;
- Uporabnost akustike pri spremljanju delovanja strojev;
- Osnovni fizikalni mehanizmi generiranja zvoka v zraku;
- Vrste mikrofonov;
- Kalibracija mikrofonov;
- Definicija ravni in enote decibel;
- Spektri in filtriranje signalov;
- Absorpcija zvoka;
- Zmanjševanje hrupa pri viru,
- Zaščitna sredstva;
- Akustika glasbe;
- Osnove psihoakustike.

Content (Syllabus outline):

- Definition of sound in air, infrasound, ultrasound, acoustic emission;
- Acoustics in air and liquid;
- Human hearing and sound perception;
- Applications of acoustics in conditioning monitoring of machines;
- Basic physical mechanisms of sound generation in the air;
- Microphone principles;
- Microphone calibration;
- Definition of decibel level;
- Spectrum and signal filtering;
- Sound absorption;
- Noise reduction;
- Protective equipment;
- Music Acoustics;
- Basic of Psychoacoustics

Temeljni literatura in viri / Readings:

A. Belšak, J. Prezelj, Vibracije in Zvok v vzdrževanju, Univerzitetni učbenik Univerze v Mariboru, 2013
G. Müller, M. Möser, Handbook of Engineering Acoustics, Springer Verlag, 2013
M. Möser, S. Zimmermann, R. Ellis, Engineering Acoustics: An Introduction to Noise Control, Springer Verlag, 2004

Cilji in kompetence:

Cilji:

- Spoznati osnovne mehanizme generiranja zvoka
- Spoznati načine širjenja zvoka po prostoru in različnih gradivih
- Razlikovati med različnimi zvočnimi pojavi in njihovimi značilnostmi
- Spoznanje o osnovnih principih izvora zvoka v stroji in napravah
- Spoznati osnovne metode meritev akustičnih veličin

Objectives and competences:

Objectives:

- To learn basic mechanisms of sound generation
- To understand mechanisms of sound propagation through air and different materials
- To distinguish between various sound phenomena and their characteristics
- To get to know basic principles of sound sources in machines and devices
- To get to know basic methods of measuring acoustic values

Kompetence:	Competences:
• Sposobnost uporabe pridobljenega znanja v praksi. • Sposobnost predstavitve osnovnih strokovnih problemov s področja akustike. • Sposobnost povezovanja znanj iz več različnih področij tehnike v akustiki	• Ability to use the attained knowledge in practice. • Ability to present basic technical problems from acoustics. • Ability to integrate knowledge from several different technical fields and acoustics.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben: • sistematsko pojasniti mehanizme generiranja zvoka in njihov način širjenja v prostoru • opisati in pojasniti zakonitosti širjenja hrupa v naravni okolici, zgradbah in delovnem okolju, • sistematsko pojasniti delovanje strojev in procesov kot virov hrupa • razložiti osnovne metode meritev akustičnih veličin in osnovne akustične pojave	Knowledge and understanding: Upon completion of this course, the student will be able to: • systematically explain the mechanisms of generating sound and its way of propagation in space • describe and explain noise propagation in natural environment, buildings and working environment • systematically explain the operation of machines and processes as sound sources • explain basic methods of measuring acoustic values and basic acoustic phenomena

Metode poučevanja in učenja:

• frontalna predavanja, • praktično delo pri avditornih vajah, • izdelava seminarske naloge.	• frontal lectures, • practical work at tutorials work, • seminar (project) work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• teoretični izpit	**40%**	• Theoretical exam
• praktični izpit	**20%**	• Practical exam
• Seminarska naloga	**40%**	• Seminar paper

Reference nosilca / Lecturer's references:

1. POLANEC, Brigita, GLODEŽ, Srečko, BELŠAK, Aleš. Noise evaluation of coated polymer gears. Polymers. Feb. 2023, vol. 15, iss. 3, [article no.] 783, 22 str. ISSN 2073-4360. https://www.mdpi.com/2073-4360/15/3/783, DOI: 10.3390/polym15030783. [COBISS.SI-ID 140770051] projekt: P2-0063; financer: Slovenian Research Agency, Research Core Funding's projekt: OP20-04332; financer: Republic of Slovenia and the European Union under the European Structural and Investment Funds
2. TROBENTAR, Boštjan, HRIBERŠEK, Matija, KULOVEC, Simon, GLODEŽ, Srečko, BELŠAK, Aleš. Noise evaluation of S-polymer gears. Polymers. Jan. 2022, vol. 14, iss. 3 (438), 16 str., ilustr. ISSN 2073-4360. DOI: 10.3390/polym14030438. [COBISS.SI-ID 95101699]
3. RAMADANI, Riad, PAL, Snehashis, KEGL, Marko, PREDAN, Jožef, DRSTVENŠEK, Igor, PEHAN, Stanislav, BELŠAK, Aleš. Topology optimization and additive manufacturing in producing lightweight and low vibration gear body. International journal of advanced manufacturing technology. Published: 03 March 2021, str. [1-13]. ISSN 0268-3768. DOI: 10.1007/s00170-021-06841-w. [COBISS.SI-ID 54234371]