Budapest University of Technology and Economics
Faculty of Chemical Technology and Biotechnology
MSc in Environmental Engineering
Dept. of Fluid Mechanics

Budapesti Műszaki és Gazdaságtudományi Egyetem
Vegyészmérnöki és Biomérnöki Kar
Környezetmérnök mesterszak MSc (levelező)
Áramlástan Tanszék

SUBJECT DATA SHEET AND REQUIREMENTS
(TANTÁRGY ADATLAP ÉS TANTÁRGYKÖVETELMÉNYEK)
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TECHNICAL ACOUSTICS AND NOISE CONTROL (MŰSZAKI AKUSZTIKA ÉS ZAJCSÖKKENTÉS)

1.	Code (kód)	Semester (szemeszter)	Requirements (követelmény)	Credit (kredit)	Language (nyelv)
	BMEGEÁTMKK1	3.	(1+1+0) f	3	English (angol)

2. Responsible person and Department (a tantárgyfelelős személy és tanszék):

Name (név):	Status (beosztás):	Department (tanszék):
Dr. Vad János	associate professor	Dept. of Fluid Mechanics BME (BME Áramlástan Tanszék)

3. Lecturer (a tantárgy előadója):

Name (név):	Status (beosztás):	Department (tanszék):
Dr. Koscsó Gábor	lecturer (óraadó)	Dept. of Fluid Mechanics BME (BME Áramlástan Tanszék)

4. The thematic background of the subject (tantárgy az alábbi témakörök ismeretére épít):

Mathematics, mechanics.

5. Compulsory/ suggested pre-request (kötelező előtanulmányi rend): -

6. Main objectives of the subject (a tantárgy célkitűzése):
The description of basic acoustic phenomena. The subject includes introductory courses on acoustic and noise control engineering design and measurement techniques used on environmental engineering.

7. The short thematic description of the subject (a tantárgy rövid tematikája):
1. Concept of acoustics, classification of the subject. The concept of sound, two-fold nature of sound. Sound in different mediums and sound classified as a function of frequency and effective sound pressure.
2. Linear acoustic model. The mathematic and physical consequence of the linearity and speed of sound. Homogeneous wave equation.
3. The general solution of the homogeneous wave equation. Harmonic waves, trigonometric and complex representation. The solution of the wave equation in a bounded space, organ pipe and room natural frequencies.
4. Model testing and similitude, Helmholtz-number. Characteristic composition of harmonic waves, standing wave and beat.
5. Acoustic resonators, the natural frequency of a Helmholtz-resonator and examples. Harmonic analysis, sound spectra, octave band. The pitch and colour of a sound, consonance and dissonance.
6. Energetic relations of acoustic waves. Kinetic and potential energy density, sound intensity, sound power, RMS value and levels. Calculation with levels. Transmission loss, insertion loss, noise reduction. Impedances.
7. Spherical waves, sound sources, monopole, dipole, longitudinal and lateral quadrupole radiators. The acoustic source model law.
8. Sound propagation in the atmosphere, far field approximation of point and line sources. Attenuation of sound waves in gases, liquids and porous solid mediums. The meteorological effects of the free field sound propagation.
9. Normal transmission of the sound from one medium to another, and transmission of obliquely incident sound waves. The transmission loss of the simple layer walls.

10. Sound propagation in duct and higher order modes. The transmission of sound at he end of a tube, exponential horns, expansion chamber and side branch resonators.
11. The energetical model of closed sound space. Direct and reverberant sound fields, equivalent absorbing area, room constant, reverberation time.
12. The subject of noise control. Physiological effects of noise. Subjective measurement units, phon, dB(A), equivalent sound pressure level. The general methodology of noise control.
13. Noise generated by mechanical, fluid mechanical and thermal processes and their reduction. Noise control in free and in bounded space. Personal noise protection.
14. Acoustic measurements, microphones, analysers, calibrators, anechoic and reverberating chambers

8. Mode of education of the Subject (A tantárgy oktatásának módja):
Presentation and laboratory display and exercises.

9. Requirements (követelmények):
To be present at the lectures and laboratory works. To hand in at least passing level laboratory measurement reports till the deadline. The laboratory work and the measurement report cannot be made up later. At least passing level examination, that contains written and, depending on the Department opinion, oral part. The measurement report result accounts for 20% of the final examination mark.

10. Consulting opportunities (konzultációs lehetőség): At the Department in prearranged appointment.

11. Reference literature (jegyzet, tankönyv, felhasználható irodalom):
Dr. Szentmártony Tibor, Dr. Kurutz Imre: A műszaki akusztika alapjai, kézirat, Tankönykiadó, Budapest, 1981, jegyzetszám: J 4-970.
A.P.Dowling, J.E.Foowcs Williams: Sound and Sources of Sound, Ellis Horwood Limited, 1983, ISBN 0-85312-400-0
Leo L. Beranek: Noise and Vibration Control, Institute of Noise Control Engineering,1988,ISBN 0-9622072-0-9

12. Approximate home study required to pass the subject (a tantárgy elvégzéséhez szüséges becsült otthoni munkaidő):
2hours/week

13. The data sheet and the requirements are prepared by (a tantárgy tematikáját kidolgozta):

Name (név):	Status (beosztás):	Department (tanszék):
Dr. Koscsó Gábor	lecturer (óraadó)	Dept. of Fluid Mechanics BME / BME Áramlástan Tanszék