SUBJECT DATA SHEET AND REQUIREMENTS

last modified: 31th January 2014

TECHNICAL ACOUSTICS AND NOISE CONTROL

MŰSZAKI AKUSZTIKA ÉS ZAJCSÖKKENTÉS

1 Code	Semester Nr. or fall/spring	Contact hours/week (lect.+semin.+lab.)	Requirements p / e / s	Credit	Language
BMEGEÁTAG15	(6.) spring	2+0+1	e	3	English

2. Subject's responsible:

Name:	Title:	Affiliation (Department):
Dr. János VAD	associate professor	Dept. of Fluid Mechanics

3. Lecturer:

Name:	Title:	Affiliation (Department):
Dr. Gábor KOSCSÓ	hon. associate professor	Dept. of Fluid Mechanics

4. Thematic background of the subject: Mathematics, Mechanics, Fluid Mechanics.

5. Compulsory / suggested prerequisites:
Compulsory: Fluid Mechanics /BMEGEÁTAG01 or BMEGEÁTAG11//

6. Main aims and objectives, learning outcomes of the subject:
The description of basic acoustic principles, application areas. The subject includes introductory courses on acoustic and noise control engineering design and measurement techniques used on mechanical and environmental engineering.

7. Method of education: lecture 2h/w, seminar 0h/w, laboratory 1h/w
Lecture room presentations (oral & blackboard presentations), and laboratory excercises. 14x2 hour lecture presenting the theoretical parts and solved problems, and 14x1 hour (in 2+6+6 hour parts) laboratory preparation and individual measurement exercises.

8. Detailed thematic description of the subject:
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 the 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

9. Requirements and grading
a) in term-period:
-To be present at the lectures (min.70% attendance is obligatory) and laboratory sessions (100% attendance is obligatory). All important subjects will be discussed during the lectures and therefore your attendance is essential.
-To hand in at least a passing (40%) level laboratory measurement reports (2 reports, each max.10points) till the deadline. The laboratory work and the measurement report cannot be made up later.
b) in examination period: -
At least passing level (40%) examination (max. 80 points), that contains written part (180minutes) and, depending on the lecturer's opinion, a further oral part. The result of the oral part is pass or fall and optionally maximum 15 extra point. The total examination result will be the sum of the measurement report points (max.20 points) and the written and oral examination point. Grading:
0 % ≤ fail (1) < 40 % 40 % ≤ satisfactory(2) < 55 % 55 % ≤ medium(3) < 70 %
70 % ≤ good(4) < 85 % 85 % ≤ excellent(5) ≤ 100 %

c) The students are subject to disciplinary measures against the application of unauthorized means at mid-terms, and the application of the 1/2013. (I.30.) Dean's Order must be followed.
The attendance of the course has certain rules, automatic assignment of Fail (1) grade in case of cheating during exams and/or plagiarism, no incompletes, and no make-up exams.

10. Retake and repeat: Due to the Code of Studies and Exams of BME.

11. Consulting opportunities: Consultation hours: by email appointments and as it is indicated on the department's website. Weekly consulting hours will be provided. The consultation time can be enquired at the department administration after the registration week of the active semester. Exam consultation is provided the day before the exam. Personal consultation: at the Department in prearranged appointment. (Availability: office phone number: 4633187, e-mail address: koscso@ara.bme.hu)

12. Reference literature (compulsory, recommended):
- 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
- http://www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEATAG15

13. Home study required to pass the subject:

Contact hours	42	h/semester
Home study for the courses	14	h/semester
Home study for the mid-semester checks	-	h/check
Preparation of mid-semester homework	4	h/homework
Home study of the allotted written notes	-	h/semester
Home study for the exam	30	h/semester
Totally:	90	h/semester

14. The data sheet and the requirements are prepared by:

Dr. Gábor KOSCSÓ	hon. associate professor	Dept. of Fluid Mechanics