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| **Noise and Vibration Protection I.** |

**Code: MFZRV31K03\_EN**

**ECTS Credit Points: 2**

Year, Semester: -

Number of teaching hours/week:

Lecture: **2**

Practice: **0**

**Prerequisites: -**

**Topics**:

This series of lectures is based on the topics of noise and vibration protection. During this class the basic concepts of sound, noise and vibration are introduced. The main topics are the following:

Noise measurement units, levels. Operation with levels (addition, subtraction and averaging of decibels). Levels of sound pressure, sound power and sound intensity. Spectra, frequency analysis bandwidths, propagation and radiation of sound, point, line and plane sources. Outdoor sounds and indoor sounds. The effect of noise on humans. Objective and subjective noise measurement scales. Sound measurements and instruments. Environmental noise, Industrial noise. Road traffic noise. Railroad traffic noise. Aircraft noise. Noise reduction and protection.The effects of vibration on humans.Vibration measurement and instrumentation.

Literature:

1. Gerhard Müller and Michael Möser: Handbook of Engineering Acoustics, 697 pages, 2013, ISBN 978-3-540-24052-5
2. M. P. Norton andD. G. Karczub: Fundamentals of Noise and Vibration Analysis for Engineers, 631 pages, 2003, ISBN 978-0-521-49561-6
3. Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung: Advanced Air and Noise Pollution Control, 526 pages, 2005, ISBN 1-58829-359-9

**Schedule**

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| **1st week:****Lecture:** Introduction,the definition of noise. Basic concepts. Speed of sound**2nd week:** **Lecture:** Noise measurement units, levels. Operation with levels (addition, subtraction and averaging of decibels). Sound pressure levels, sound power levels and sound intensity levels.**3rd week:****Lecture:** Spectra, frequency analysis bandwidths, Octave and third-octave bands**4th week:****Lecture:** Outdoor sound, propagation and radiation of sound, wind and temperature gradients, Point, line and plane sources**5th week:****Lecture:** Indoor sound types, Sound build-up and sound decay, Energy density and reverberation time, relationship between direct and reflected sound types | **6th week:****Lecture:**The effect of noiseon humans. Perceptual acoustics. Loudness, Phone, Son. Fletcher-Munson curves**7th week:****Lecture:**Objective and subjective noise measurement scales. Sound measurements and instruments**8th week:****Lecture:****Mid-term test****9th week:****Lecture:**Environmental noise, Industrial noise. Road traffic noise. Railroad traffic noise. Aircraft noise.**10th week:****Lecture:**Noise reduction and protection. Absorptive materials. Sound isolation. Strategic noise mapping. |

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| **11th week:****Lecture:**Basic concepts of vibration. Vibration measurement units and scales.**12th week:****Lecture:** The effects of vibration on humans.  | **13th week:****Lecture:** Vibration measurement and instrumentation.**14th week:****Lecture:**Calculation and problem solving.**15th week:****End-term test** |

**Requirements**

**A, for a signature:**

During the semester there are two tests: the mid-term test is in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

**B, for a grade:**

The course ends in **mid-semester grade (AW5)**. The mid-semester grade is calculated as an average of the two test results. The minimum requirement for the mid-term and end-term tests is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following table:

Score Grade

0-50 fail (1)

51-62 pass (2)

63-75 satisfactory (3)

76-87 good (4)

88-100 excellent (5)

If the score of any test is below 50, the student once can take a retake test.