BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS

FACULTY OF MECHANICAL ENGINEERING

SUBJECT DATASHEET

I. SUBJECT DESCRIPTION

1. GENERAL DATA

1.1. Subject name (in Hungarian, in English)

Advanced Technical Acoustics and Measurement Techniques • Advanced Technical Acoustics and Measurement Techniques

1.2. Neptun code

BMEGEÁTNW10

1.3. Type

study unit with contact hours

1.4. Course types and number of hours (weekly / semester)

course type	number of hours (weekly)	nature (connected / stand-alone)
lecture (theory)	2	-
exercise	-	-
laboratory exercise	1	coupled

1.5. Type of assessments (quality evaluation)

mid-term grade

1.6. ECTS

3

1.7. Subject coordinator

name:	Dr. Horváth Csaba (71949162105)
post:	adjunct
contact:	horvath@ara.bme.hu

1.8. Host organization

Department of Fluid Mechanics (http://www.ara.bme.hu/)

1.9. Course homepage

http://www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEATNW10

1.10. Course language

english

1.11. Primary curriculum type

mandatory elective

1.12. Direct prerequisites

Strong prerequisite:	-
Weak prerequisite:	-
Parallel prerequisite:	-
Milestone prerequisite:	-
Excluding condition:	-

(the subject cannot be taken if you have previously completed any of the following subjects or groups of subjects)

2. AIMS AND ACHIEVEMENTS

2.1. Aim

The aim of the course is to acquaint students with the methods of acoustic measurement and simulation, with special emphasis on laying the basics of aeroacoustics, aeroacoustic simulation methods, and the foundations of modern aeroacoustic measurement methods. Students will learn the theory and characteristics of each simulation and measurement method, as well as the basics of evaluating the results achieved. The modern methods presented are common methods in research and development that can be encountered in engineering practice.

2.2. Learning outcomes

Competences that can be acquired by completing the course:

A. Knowledge

- The student is familiar with general concepts used in aeroacoustics.
- The student systematizes aeroacoustic measurement methods according to different aspects.
- The student is aware of the factors influencing the results of aeroacoustic measurements.
- Understands the types, structure, and categorization of aeroacoustic measurement methods.
- The student has a comprehensive knowledge of the limitations of the applicability of the main aeroacoustic measurement methods.
- The student knows the structure and operating principle of modern aeroacoustic measuring devices and their accessories.
- Understands the principle of aeroacoustic measurement methods, their advantages and disadvantages, and the limitations of application.
- The student compares different aeroacoustic measurement methods.
- Systematizes aeroacoustic simulation methods according to different aspects.
- The student is aware of the factors influencing the results of aeroacoustic simulations.
- Understands the types, structure, and categorization of aeroacoustic simulation methods.
- The student has a comprehensive knowledge of the limitations of the applicability of the main aeroacoustic simulation methods.
- Understands the principle of aeroacoustic simulation methods, their advantages and disadvantages, application limitations.
- The student compares different aeroacoustic simulation methods.

B. Ability

- Selects measurement methods suitable for determining specific aeroacoustic characteristics.
- Interprets the regulations, instructions, rules described for aeroacoustic measurement tests.
- The student explores the factors influencing specific aeroacoustic measurement methods.
- Selects the equipment and tools required for aeroacoustic measurements.
- Prepares aeroacoustic measurements based on laboratory instructions.

- At a basic level, the student operates the main aeroacoustic measuring equipment and devices independently.
- Evaluates results measured with various aeroacoustic measuring devices and gauges.
- From the measurement results, the student infers the acoustic properties of the studied cases.
- Selects the applicable aeroacoustic simulation method depending on the properties of the case / phenomenon to be investigated.
- Selects simulation methods to determine specific aeroacoustic characteristics.
- Interprets the regulations, instructions, rules described for aeroacoustic simulation tests.
- The student explores the factors influencing specific aeroacoustic simulation methods.
- Evaluates aeroacoustic simulation results.
- From the simulation results, the student infers the acoustic properties of the studied cases.

C. Attitude

- The student constantly monitors their work, results, and conclusions.
- The student expands their knowledge of energy management and sustainability through continuous learning.
- Open to the use of information technology tools.
- The student strives to get to know and routinely use the tools needed for energy management and economic problem-solving.
- The student develops their ability to provide accurate and error-free problem solving, engineering precision, and accuracy.
- The student applies the principles of energy efficiency, sustainability, and environmental awareness in solving energy management tasks.
- The student monitors changes in the social, economic, and political system.
- When communicating the results, the student follows the rules of the profession.
- The student publishes opinions and views without offending others.

D. Independence and responsibility

- Collaborates with the instructor and fellow students to expand knowledge.
- Accepts well-founded professional and other critical remarks.
- In some situations, as part of a team, the student works with fellow students to solve tasks.
- With the student's knowledge, makes a responsible, informed decision based on analyzes.
- The student feels responsible for energy, the problems of energy management, and the sustainable use of the environment, as well as present and future generations.
- The student is committed to the principles and methods of systematic thinking and problem solving.

2.3. Teaching methodology

The methodology of the course consists of independent learning, teaching from lectures, and laboratory exercises. The lectures discuss the content of the educational material which is to be learned independently and in advance of the lectures. On these occasions, there is an opportunity to discuss self-acquired material, supplemented by additional materials and summaries presented with frontal educational techniques. The application and skill-level acquisition of knowledge takes place in laboratory exercises.

2.4. Support materials

a) Textbooks

S. Glegg and W. Devenport: Aeroacoustics of Low Mach Number Flows: Fundamentals, Analysis, and Measurements, Academic Press, 2017, ISBN 978-0-12-809651-2

b) Lecture notes

Csaba Horváth: Advanced Technical Acoustics and Measurement Techniques (lecture notes), 2020

c) Online materials

http://www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEATNW10

2.5. Validity of the course description

Start of validity:	2020. March 3.
End of validity:	2024. December 31.

II. SUBJECT REQUIREMENT

3. ACHIEVEMENT CONTROL AND EVALUATION

3.1 General rules

Learning outcomes are assessed on the basis of a mid-semester written and oral summary performance assessment and a partial performance assessment. The summarizing academic performance assessment is a complex, written method of assessing the knowledge and ability type competence elements of the subject in the form of a written exam, while the oral assessment method is the elaboration and description of pre-defined items. These summative academic performance assessments require the required lexical knowledge to be taken into account during performance assessment. Partial performance evaluation is a complex way of evaluating the knowledge, ability, attitude, and autonomy, and responsibility type competence elements of the subject, the form of which is the group-based laboratory measurement and its report.

3.2 Assessment methods

A. Detailed description of mid-term assessments

1. Mid-term assessment

type: summative assessment

count: 1

purpose, description: Summative assessments collectively examine and assess student's learning outcomes defined by knowledge and ability type competencies. Accordingly, each summative assessment assesses the acquisition of the designated theoretical knowledge and the existence of knowledge, and the application of skills gained in lectures and laboratory practice. The written summary assessment focuses 85% on theoretical knowledge and 15% on application skills. These will be completed on the dates specified in the academic performance assessment plan, expected to be the 14th week of the semester. Therefore, 45 points can be obtained on the written summary performance evaluation. A minimum of 40% needs to be achieved.

2. Mid-term assessment

type: diagnostic assessment

count: 1

purpose, description: Summative assessments collectively examine and assess student's learning outcomes defined by knowledge and ability type competencies. Accordingly, each summative assessment assesses the acquisition of the designated theoretical knowledge and the existence of knowledge, and the application of skills gained in lectures and laboratory practice. The oral summative assessment focuses 85% on theoretical knowledge and 15% on application skills. They will be completed on the dates specified in the academic performance assessment plan, expected to be the 14th week of the semester. 45 points can be obtained on the oral summary performance evaluation. A minimum of 40% is to be achieved.

3. Mid-term assessment

type: formative assessment, simple

count: 1

purpose, description: Partial performance assessments collectively examine and assess student's learning outcomes determined by the knowledge and ability type of competencies applied. Accordingly, each sub-performance assessment assesses the existence of knowledge and the application of skills gained in laboratory practices. Partial performance assessments focus 15% on theoretical knowledge and 85% on application skills. For their fulfillment, active participation in laboratory sessions and a minimum level on laboratory reports is required. As a result, 10 points can be obtained on the written partial performance evaluations (reports). A minimum of 40% is to be achieved.

B. Detailed description of assessments performed during the examination period (if relevant)

Elements of the exam:

1. written partial exam
   -
2. oral partial exam
   -
3. practical partial exam
   -
4. inclusion of mid-term results
   -

3.3 The weight of mid-term assessments in signing or in final grading

identifier	**weight**
1 . Mid-term assessment	40 %
2 . Mid-term assessment	40 %
3 . Mid-term assessment	20 %

3.4 The weight of partial exams in grade (if relevant)

type	**weight**
written partial exam	0 %
oral partial exam	0 %
practical partial exam	0 %
inclusion of mid-term results	0 %

3.5 Determination of the grade

grade ● [ECTS]	**the grade expressed in percents**
very good(5) ● Excellent [A]	above 85%
very good(5) ● Very Good [B]	85% .. 85%
good(4) ● Good [C]	70% .. 85%
satisfactory(3) ● Satisfactory [D]	55% .. 70%
sufficient(2) ● Pass [E]	40% .. 55%
insufficient(1) ● Fail [F]	below 40%

The lower limit specified for each grade already belongs to that grade.

3.6 Attendance and participation requirements

Must be present at at least **70%** (rounded down) of lectures.

At least **85% of** laboratory practices (rounded down) must be actively attended.

3.7 Special rules for improving, retaken and replacement

The special rules for improving, retaken and replacement shall be interpreted and applied in conjunction with the general rules of the CoS (TVSZ).

Need mid-term assessment to individually complete?

yes

Can the submitted and accepted partial performance assessments be resubmitted until the end of the replacement period in order to achieve better results?

yes

The way of retaking or improving a summary assessment for the first time:

each summative assessment can be retaken or improved

Is the retaking-improving of a summary assessment allowed, and if so, than which form:

retake or grade-improving exam possible for each assesment separately

Taking into account the previous result in case of improvement, retaken-improvement:

new result overrides previous result

The way of retaking or improving a partial assessment for the first time:

partial assesment(s) in this group can be improved or repeated once up to the end of the repeat period

Completion of unfinished laboratory exercises:

missed laboratory practices must be performed in the teaching term at pre-arranged appointment

Repetition of laboratory exercises that performed incorrectly (eg.: mistake in documentation):

incorrectly performed laboratory practice (e.g. Incomplete/incorrect report) can be corrected upon improved re-submission

3.8 Study work required to complete the course

Activity	**hours / semester**
participation in contact classes	42
preparation for laboratory practices	14
preparation for summary assessments	16
elaboration of a partial assessment task	4
additional time required to complete the subject	14
summary	**90**

3.9. Validity of subject requirements

Start of validity:	2020. March 3.
End of validity:	2024. December 31.

4. ADDITIONAL INFORMATION

4.1 Primary course

The primary (main) course of the subject in which it is advertised and to which the competencies are related:

mechanical_modelling

4.2 Link to the purpose and (special) compensations of the Regulation KKK

This course aims to improve the following competencies defined in the Regulation KKK>

a) knowledge

- Student has the theoretical and practical knowledge and methodological skills to design, manufacture, model, operate and manage complex engineering systems and processes

b) ability

- Student has the ability to apply and put into practice the knowledge acquired, using problem-solving techniques.

c) attitude

- Student has the ability to plan and carry out tasks to a high professional standard, either independently or in a team.

d) independence and responsibility

- Student acts independently and proactively in solving technical problems.

4.3 Prerequisites for completing the course

Knowledge type competencies (a set of prior knowledge, the existence of which is not obligatory, but greatly facilitates the successful completion of the subject)	-
Ability type competencies (a set of prior abilities and skills, the existence of which is not obligatory, but greatly contributes to the successful completion of the subject)	-