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)

Fluid Mechanics I. (PhD) ● Fluid Mechanics I. (PhD)

1.2. Neptun code

BMEGEÁT4A08

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	-	-

1.5. Type of assessments (quality evaluation)

exam

1.6. ECTS

3

1.7. Subject coordinator

name:	Vad János Gábor (71958341366)
post:	university professor
contact:	vad@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/BMEGEAT4A08/

1.10. Course language

hungarian

1.11. Primary curriculum type

komplex vizsga tárgycsoport PhD tárgy

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 acquire flow knowledge and skills based on research studies in the undergraduate and master's programs, applying flow knowledge in a way customized to the doctoral program, further developing it in a creative and practical way, taking into account research aspects, especially short, medium-term research results. and its long-term engineering and industrial applicability and utilization.

2.2. Learning outcomes

Competences that can be acquired by completing the course:

A. Knowledge

- The student knows the flow motives and basic knowledge included in his / her own doctoral research program.
- The student knows the connection points of fluid research aspects with other disciplines related to doctoral research.
- The student, based on his engineering approach, knows the flow aspects of the expected results of doctoral research.
- The student, starting from his / her engineering approach, identifies the engineering applications of the expected results of the doctoral research.
- The student will be informed about the flow motives of other doctoral programs cared for within the Doctoral School based on the information provided by his / her peers.
- The student will be informed about the current state of the field of fluid science ("State of the Art").
- The student will be informed about the basic criteria for the presentation of flow-related results.
- The student is aware of the basic relations of mathematics and its mathematical descriptive equations.
- The student is aware of the basic principles of flow measurement technology introduced in research.
- The student is aware of the basic principles of fluid mathematical modeling established in research.

B. Ability

- The student uses the concepts of subject and research topic area.
- The student analyzes the available domestic and international literature sources in the field.
- The student interprets the characteristics of the flow space characteristic of the research topic area and the factors influencing them.
- The student is able to derive and calculate the quantities associated with the subject and his / her research topic, specific to his / her field of fluid science.
- The student identifies the parameters related to the subject and its research topic, characteristic of its field of fluid science, and the possibilities of their theoretical and practical modification.
- The student applies flow-related physical modeling knowledge related to the subject and his/her research topic, which is important in the field of fluid mechanics.
- The student applies flow mathematical modeling knowledge related to the subject and his/her research topic, which is important in the field of fluid mechanics.

- The student is able to formulate key questions related to the subject and his / her research topic, related to important factors, parameters, physical characteristics in the field of fluid mechanics, important for modeling.
- The student selects the appropriate methods for the specific fluid dynamics problem.
- The student outlines the current engineering solutions, key theoretical issues and state-of-the-art practical solutions of the subject and the research topic area.

C. Attitude

- The student constantly monitors his/her work, results and conclusions.
- The student expands his/her knowledge of flow theory through continuos acquisition of knowledge.
- The student is open to the use of information technology tools.
- The student seeks to learn about and routinely use the system of tools needed to solve fluid flow problems.
- The student develops skills for accurate and error-free problem solving, engineering precision and precision.
- The student strives for demanding engineering work and makes a decision based on careful consideration and care.
- The student monitors the processes taking place in the social, economic and political system.
- The student publishes his / her results in accordance with the rules and expectations of the profession.
- The student publishes his / her opinions and views without offending others.

D. Independence and responsibility

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

2.3. Teaching methodology

A) In the lectures of the subject held at a given time on a weekly basis, the student gives a summary lecture related to the individual research topic of the student. B) The lecturer, in cooperation with the fellow students, raises critical questions, by answering and elaborating in detail the student can deepen the flowological aspects and practical embeddedness of the doctoral research. C) The student conducts a detailed literature search based on the critical questions and develops answers to the critical questions. D) Based on the elaborated answers, the student further develops the previous presentation and presents the improved presentation in dance. e) Based on the improved presentation, the student develops a short essay that - even as an appendix to the future PhD dissertation - strengthens the dissertation from a flow perspective. During the solution of individual tasks, within the framework of the lectures or beyond that, consultation is possible.

2.4. Support materials

a) Textbooks

Tamás Lajos: Basics of fluid mechanics. (Tamás Lajos, 2015.) ISBN 978 963 12 2885 4.

b) Lecture notes

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c) Online materials

http://www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEAT4A08/

2.5. Validity of the course description

Start of validity:	2020. February 15.
End of validity:	2024. December 31.

II. SUBJECT REQUIREMENT

3. ACHIEVEMENT CONTROL AND EVALUATION

3.1 General rules

INTERIM PERFORMANCE EVALUATION: a) Presentation 1: summary presentation related to the student's individual research topic. Possible score: max. 20%. b) Presentation 2: an improved summary presentation related to the student's individual research topic, further developed based on the critical questions defined by the instructor. Possible score: max. 30%. EXAMINATION: c) Essay: a 1 ... 5 page written summary essay to be prepared outside the contact hours, which can be mapped in both format and content to the appendix of the future PhD dissertation, according to the needs of the research program. Possible score: max. 50%. At the end of the semester, the result of the exam consists of 2 presentation elements of the mid-year performance evaluation and 1 exam paper.

3.2 Assessment methods

A. Detailed description of mid-term assessments

1. Mid-term assessment

type: formative assessment, point-in-time personal act

count: 1

purpose, description: A presentation lecture to be developed during the semester, linked to the PhD research, which helps to critically raise issues related to the doctoral topic, through theoretical and practical considerations. The aim of the partial achievement is to examine the existence of knowledge, ability, attitude, and learning outcomes belonging to the autonomy and responsibility competence group. Upon successful completion of the task, the student stabilizes and further develops the knowledge acquired before the start of the doctoral program in the field of fluid science.

2. Mid-term assessment

type: formative assessment, point-in-time personal act

count: 1

purpose, description: A presentation lecture to be developed during the semester, linked to the PhD research, which helps to critically raise issues related to the doctoral topic, through theoretical and practical considerations. The aim of the partial achievement is to examine the existence of knowledge, ability, attitude, and learning outcomes belonging to the autonomy and responsibility competence group. Upon successful completion of the task, the student stabilizes and further develops the knowledge acquired before the start of the doctoral program in the field of fluid science. Particular attention should be paid to the development compared to the previous performance appraisal in the presentation, which should answer the critical questions.

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

Elements of the exam:

1. written partial exam

obligation: mandatory (partial) exam unit, failing the unit results in fail (1) exam result

Essay: a 1 ... 5 page written summary essay to be prepared outside the contact hours, which can be mapped in both format and content as an appendix to the future PhD dissertation, according to the needs of the research program. Upon successful completion of the task, the student stabilizes and

description: further develops the knowledge acquired before the start of the doctoral program in the field of fluid science. Particular attention should be paid to the content and form of the written essay, so during the evaluation its fit into a doctoral dissertation plays an important role both in terms of content and form.

2. oral partial exam

-

3. practical partial exam

-

4. inclusion of mid-term results

obligation: mandatory (partial) exam unit, failing the unit results in fail (1) exam result

description: The score for the summary oral presentation (assisted by a computer presentation) called Presentation 1: maximum 20%, the score for the improved summary oral presentation (assisted by a computer presentation) called Presentation 2: maximum 30%. The score obtained on these is 50% of the exam ticket. There are no additional rules, requirements or other ways of offsetting interim 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	60 %

The condition for signing is that the score obtained in the mid-year assessments is at least **40%**.

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

type	**weight**
written partial exam	50 %
oral partial exam	0 %
practical partial exam	0 %
inclusion of mid-term results	50 %

3.5 Determination of the grade

grade ● [ECTS]	**the grade expressed in percents**
very good(5) ● Excellent [A]	above 95%
very good(5) ● Very Good [B]	85% .. 95%
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.

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).

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

3.8 Study work required to complete the course

Activity	**hours / semester**
participation in contact classes	28
exam preparation	21
additional time required to complete the subject	41
summary	**90**

3.9. Validity of subject requirements

Start of validity: 2020. February 15.

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_engineering_sciences_PhD_programme

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

b) ability

c) attitude

d) independence and responsibility

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)	BSc and MSc level flow theory and flow engineering theory; knowledge of physical and numerical modeling of flows; comprehensive knowledge of the design, performance and evaluation of flow simulation studies

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)	Independent, creative engineering problem-solving ability, ability to recognize and analyze the essential connections between complex flow phenomena and flow engineering processes