SUBJECT DATA SHEET AND REQUIREMENTS

last modified: 5th December 2013

ADVANCED FLUID MECHANICS

AZ ÁRAMLÁSTAN VÁLOGATOTT FEJEZETEI

1	Code	Semester Nr. or fall/spring	Contact hours/week (lect.+semin.+lab.)	Requirements p / e / s	Credit	Language
	BMEGEÁTMW01	**1.(2.*)spring**	**3+0+0**	**e**	**4**	**English**

*: in case of enrolment in fall

2. Subject's responsible:

Name:	Title:	Affiliation (Department):
Dr. Gergely KRISTÓF	associate professor	Dept. of Fluid Mechanics

3. Lecturer:

Name:	Title:	Affiliation (Department):
Dr. Gergely KRISTÓF	associate professor	Dept. of Fluid Mechanics

4. Thematic background of the subject:

Fluid mechanics

5. Compulsory / suggested prerequisites:

Compulsory: -

Suggested: Fluid Mechanics (BSc level) BMEGEÁTAG01, -AG11, -AE01, -AM01, -AM11, -AM21, -AKM1, -AT01, -MF03

6. Main aims and objectives, learning outcomes of the subject:

Understanding of physical phenomena occurring in various flow categories of technical relevance.

Practical knowledge in analysing flow phenomena.

7. Method of education: lecture 3h/w, seminar 0h/w, laboratory 0h/w, Illustrative problems are solved and discussed in lecture time

8. Detailed thematic description of the subject:

1. Overview of the fundaments of fluid mechanics. Vorticity transport equation.
2. Potential flows, solution methods based on analytical solutions.
3. Percolation, Darcy flow. Wells.
4. Boundary layers. Similarity solutions for laminar and turbulent boundary layers.
5. Transition. Turbulent boundary layers. BL control.
6. Overview of computational fluid dynamics (CFD). Turbulence models.
7. Fundaments of gas dynamics. Wave phenomena. Isentropic flow.
8. Normal shock waves.
9. Oblique shock waves, wave reflection. Prandtl-Meyer expansion. Supersonic jets.
10. Atmospheric flows.
11. Aerosols.
12. Aeroacoustics.
13. Pipe networks.

Budapest University of Technology and Economics
Faculty of Mechanical Engineering
Department of Fluid Mechanics

Hungary, 1111 Budapest, Bertalan L. u. 4-6.
Telefon: (36-1) 463-4072 Fax: (36-1) 463-3464
http://www.ara.bme.hu

14. Case studies.

9. Requirements and grading
a) in term-period:
The subject involves no midterm tests. Lecture attendance due to the Code of Studies and Exams of BME, as follows:

signed: attending on min.70% of the lectures. According to academic regulations, students may miss a maximum of 30% of the classes. After having missed 30% of the classes, the professors have the right to give the student an *refused* (no credit) grade (see Code of Studies and Exams of BME).

b) in examination period: written exam: The subject is concluded with examination which consists of solution of practical problems, which has been discussed in lecture time and answering essay questions about the theoretical topics. The list of theoretical questions for exam is available on the web page (see 12. References for the link) of the course.

Grading: 0%-39%: fail(1); 40%-54% pass(2), 55%-69%: satisfactory (3), 70%-84%: good(4), 85%-100%: excellent (5)

c) The students are subject to disciplinary measures against the application of unauthorized means at mid-terms, term-end exams and homework and the application of the 1/2013. (I.30.) Dean's Order must be followed.

10. Retake and repeat
Any further movements are 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.

12. Reference literature (compulsory, recommended):
- Lecture notes: hand-outs
- Books:
  Lamb, H.: Hydrodynamics, 1932.
  Schlichting, H.: Boundary Layer Theory, 1955.
  Shapiro, A. H: The Dynamics and Thermodynamics of Compressible Fluid Flow, 1953.
  Streeter, V. L, Wylie, E. B: Fluid Mechanics, McGraw-Hill, 1975.
  Ferziger, J. H. & Peric, M.: Computational Methods for Fluid Dynamics, Springer,2002, ISBN 3-540-42074-6
- Downloadable materials: www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEATMW01

13. Home study required to pass the subject:

Contact hours	42	h/semester
Home study for the courses	21	h/semester
Home study for the mid-semester checks	-	h/check
Preparation of mid-semester homework	-	h/homework
Home study of the allotted written notes	21	h/semester
Home study for the exam	36	h/semester
Totally:	**120**	**h/semester**

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

Name:	Title:	Affiliation (Department):
Dr. Gergely KRISTÓF	associate professor	Dept. of Fluid Mechanics

Budapest University of Technology and Economics
Faculty of Mechanical Engineering
Department of Fluid Mechanics

Hungary, 1111 Budapest, Bertalan L. u. 4-6.
Telefon: (36-1) 463-4072 Fax: (36-1) 463-3464
http://www.ara.bme.hu