

2009.01.05.

Budapesti Műszaki és Gazdaságtudományi Egyetem  
Gépészmérnöki Kar  
Áramlástan Tanszék  
Mechanical Engineering Modelling (MSc)  
Fluid Mechanics major (MSc)

Budapest University of Technology and Economics  
Faculty of Mechanical Engineering  
Department of Fluid Mechanics  
Mechanical Engineering Modelling (MSc)  
Fluid Mechanics major (MSc)

## Advanced Fluid Mechanics (Az áramlástan válogatott fejezetei)

1.	<i>Code (kód)</i>	<i>Semester (szemeszter)</i>	<i>Requirements (követelmények)</i>	<i>Credit (kredit)</i>	<i>Language (nyelv)</i>
	BMEGEÁTMW01	1.	lect./sem./lab. (exam / pract. / signat.) 3/0/0 (e)	4	English

### 2. Responsible person and Department (Tantárgyfelelős személy és Tanszék):

<i>Name (név):</i>	<i>Status (beosztás):</i>	<i>Department (tanszék):</i>
Dr. Gergely KRISTÓF	associate professor	Dept. Fluid Mechanics

### 3. Lecturer (A tantárgy előadója):

<i>Name (név):</i>	<i>Status (beosztás):</i>	<i>Department (tanszék):</i>
Dr. Gergely KRISTÓF	associate professor	Dept. Fluid Mechanics

### 4. Thematic background of the subject (A tantárgy az alábbi témakörök ismeretére épít):

Fluid mechanics

### 5. Compulsory / suggested pre-requisites (Kötelező/ajánlott előtanulmányi rend):

	<i>Subject name (tárgynév)</i>	<i>Code (tárgykód)</i>
Compulsory pre-requisites:	-	-
Suggested pre-requisites:	Fluid mechanics	BMEGEÁTAG01 or BMEGEÁTAE01 or BMEGEÁTAM01 or BMEGEÁTMF03

### 6. Main objectives of the subject (A tantárgy célkitűzései):

Understanding the physical phenomena occurring in various flow categories of technical relevance.  
Practical knowledge in analyzing flow phenomena.

### 7. Detailed thematic description of the subject (A tantárgy részletes tematikája):

1. Overview of the fundamentals 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. Fundamentals of gas dynamics. Wave phenomena. Izentropic 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.
14. Case studies.

**8. Mode of education of the subject (A tantárgy oktatásának módja):**

Theoretical lectures with quantitative analyses of practical problems.

**9. Requirements (Követelmények):**

Written examination.

%	Mark
0-39	1
40-54	2
55-69	3
70-84	4
85-100	5

**10. Consulting opportunities (Konzultációs lehetőségek):**

Weekly consulting hours will be provided. The consultation time can be enquired at the department administration after the registration week of the active semester.

**11. Reference literature (Jegyzet, tankönyv, felhasználható irodalom):**

– Website of the subject: <http://www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEATMW01>

– Lecture handouts.

For further reference:

– 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, ISBN 3-540-42074-6, 2002.

**12. Home study required to pass the subject (A tantárgy elvégzéséhez szükséges tanulmányi munka):**

Estimated time for home studies: 2 hours/week.

**13. The data sheet and the requirements are prepared by (A tantárgy tematikáját kidolgozta):**

Budapest, 5<sup>th</sup> of January 2009

<i>Name (név):</i>	<i>Status (beosztás):</i>	<i>Department (Tanszék):</i>
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