



SUBJECT DATA SHEET AND REQUIREMENTS

last modified: 5th December 2013

THERMAL PHYSICS

HŐFIZIKA

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

2. Subject's responsible:

Name:	Title:	Affiliation (Department):
Dr. Balázs Czél	Assistant Professor	Dept. of Energy Engineering

3. Lecturer:

Name:	Title:	Affiliation (Department):
Dr. Balázs Czél	Assistant Professor	Dept. of Energy Engineering

4. Thematic background of the subject:

The subject is based on the knowledge and skills of the undergraduate level Mathematics and Heat Transfer subjects.

5. Compulsory / suggested prerequisites:

Compulsory: none
Suggested: Heat Transfer (BMEGEENAEHK)

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

The aim of the subject is to provide a deeper understanding of heat conduction processes. The labs provide tools for solving complicated heat conduction problems by numerical methods.

7. Method of education:

There are 2 hours of lecture and 1 hour of computer laboratory every week. One homework assignment has to be completed by the end of the term-period.

8. Detailed thematic description of the subject (by topic, min. 800 character):

Physical backgrounds, mechanism and models of heat conduction in solids; measurement of thermophysical properties; steady state and transient methods; numerical modeling of 1D and 2D heat conduction problems, inverse heat conduction problem.

1. Heat conduction review (heat diffusion equation, boundary conditions)
2. What are thermophysical properties?
3. Different heat conduction models
4. Finite difference and control volume method for the solution of heat conduction problems
5. Measurement of the thermal conductivity
6. Measurement of the thermal diffusivity
7. Measurement of the specific heat capacity; direct determination of the temperature dependency of the properties
8. Inverse heat conduction problems
9. 2D steady-state heat conduction with contact boundary condition
10. Transient heat conduction with different boundary conditions (modeling the laser flash method)
11. Transient heat conduction with contact boundary condition
12. Transient heat conduction with temperature dependent thermophysical properties (modeling the BICOND method)
13. Homework consultation
14. Homework consultation

9. Requirements and grading

a) in term-period

- One homework has to be submitted by the end of the term-period graded above 50%.
- Two tests, each graded above 50%.
- The final score (FS) is calculated as the average of the percentage values of the homework and the two tests. The final grade is determined using the final score applying the following limits:

$85\% \leq FS$	A (excellent)
$72\% \leq FS < 85\%$	B (good)
$65\% \leq FS < 72\%$	C (satisfactory)
$50\% \leq FS < 65\%$	D (pass)
$FS < 50\%$	F (fail)

b) in examination period

– none

c) Disciplinary Measures Against the Application of Unauthorized Means at Mid-Terms, Term-End Exams and Homework

Supplement to 1/2013. (I. 30.) Dean's Order (Codicil): The following students are subject to disciplinary measures.

- (a) Those students who apply unauthorized means (book, lecture notes, etc.), different from those listed in the course requirements and/or adopted by the lecturer in charge of the course assessment, in the written mid-term exams taken, and/or invite/accept any assistance of fellow students, with the exception of borrowing authorized means, will be disqualified from taking further mid-term exams in the very semester as a consequence of their action. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission option. Final term-end results in courses with practical mark will automatically become Fail (1), the ones with exam requirements will be labelled Refused Admission to Exams.

- (b) Those students whose homework verifiably proves to be of foreign extraction, or alternatively, evident results or work of a third party, are referred to as their own, will be disqualified from taking further assessment sessions in the very semester as a consequence of their action. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission options. Final term-end results in courses with practical mark will automatically become Fail (1), ones with exam requirements will be labelled Refused Admission to Exams.
- (c) Those students who apply unauthorized means (books, lecture notes, etc.), different from those listed in the course requirements and/or adopted by the lecturer in charge of the course assessment, in the written term-end exams taken, and/or invite/accept any assistance of fellow students, with the exception of borrowing authorized means, will immediately be disqualified from taking the term-end exam any further as a consequence of their action, and will be inhibited with an automatic Fail (1) in the exam. No further options to sit for the same exam can be accessed in the very same exam period.
- (d) Those students who alter, or make an attempt to alter the already corrected, evaluated, and distributed test or exercise/problem,
- i.) as a consequence of their action, will be disqualified from further assessments in the respective semester. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission options. Final term-end results in courses with practical mark will automatically become Fail (1), the ones with exam requirements will be labelled Refused Admission to Exams;
 - ii.) and will immediately be inhibited with an automatic Fail (1) in the exam. No further options to sit for the same exam can be accessed in the very same exam period.

10. Retake and repeat

There is a retake for both tests in the examination period. Late submission of the homework is possible applying the general rules.

11. Consulting opportunities:

Consultation hours: the general consultation hours of the lecturer are posted at energia.bme.hu at the beginning of each semester.

12. Reference literature (compulsory, recommended):

- Books recommended:
 - Maglic, K. D., Cezairliyan, A., Petelsky, V. E.: Compendium of Thermophysical Property Measurement Methods, Vol. 1, Plenum Press, New York, 1984.
 - Özisik, M. N.: Finite Difference Methods in Heat Transfer, CRC Press, 1994.
- Downloadable materials: energia.bme.hu/~czel or <ftp://ftp.energia.bme.hu/pub/>

13. Home study required to pass the subject:

Contact hours	42	h/semester
Home study for the courses	14	h/semester
Home study for the mid-semester checks	12	h/check
Preparation of mid-semester homework	10	h/homework
Home study of the allotted written notes	-	h/semester
Home study for the exam	-	h/semester
Totally:	=30×3credits	h/semester

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

Name:	Title:	Affiliation (Department):
Dr. Balázs Czél	Assistant Professor	Dept. of Energy Engineering