Tárgytematika / Course Description

Thermo- and Hydrodynamics

GKNB_MGTA003

Tárgyfelelős neve / Teacher's name: Hadas Ádám
Félév / Semester: 2019/20/1
Beszámolási forma / Assesment: Folyamatos számonkérés
Tárgy heti óraszáma / Teaching hours(week): 2/2/0
Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

Based on the previously acquired physical and mathematical knowledge, students learn the basic theoretical principles of flow, thermodynamics and heat transfer;
practice their application, which is essential for acquiring knowledge of other subjects that build on the subject, and in later general engineering practice.

TANTÁRGY TARTALMA / DESCRIPTION

Syllabus:

1. week - Basic laws of hydrostatics. Calculation of force from pressure in simple and complex fields. Capillarity.
2. week - Fundamentals of flow, conservation of flow properties (continuity equation, Bernoulli's equation and conversation of momentum) and their applications.
3. week - Flow of viscous fluids, features of flow in tubes and drains. Determination the energy-loss.
4. week - The characteristics of flows around solid bodies in open spaces. Determination of drag and lift around aerofoil.

I. TEST (Fluid statics, flow of ideal and viscous fluids) on ---04/10/2019--- from **8.00am to 12.00pm** (**last check-in**), location: University Library

5. week - Ideal gas law (equation of state), first law of thermodynamics. Processes of ideal gases and mixtures of gases.
6. week - Thermodynamic cycles. Second law of thermodynamics. Definition and applications of enthropy.
7. week - Irreversibility in processes of real gases.
8. week - Processes of vapours. Definition of enthalpy. Property tables and charts for vapours and their handling.
9. week - The humid air. Applying the diagram of humid air to follow its processes.

II. TEST (Processes and cycles of ideal and real gases or mixtures of gases) on ---31/10/2019 **from 8.00am to 12.00pm** (**last check-in**), location: University Library

10. week - Fourier's law of heat conduction, and its application for planar- or cylindrical walls, rods and heatsinks.
11. week - Newton's law of heat convection. Coefficient of heat convection. Methods and formulae to determine the coefficint of heat convection.

12. week - Calculation of thermal transmittance in case of planar-, cylindrical surfaces or heatsinks.
13. week - Stefan-Boltzmann law of heat radiation. Calculation the thermal energy transmitted by heat radiation. Calculations of shielding against heat radiation.

III. TEST (Heat transfer) on ---06/12/2019 from **8.00am to 11.00am** (**last check-in**), location: University Library

14. week - Summary.

Retake test on ---12/12/2019 from **8.00am to 11.00pm** (**last check-in**), location: University Library

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Mid-semester work

To write all the test during the semester is obligatory.The student is only entitled to write the computer test if he / she accepts the computer test rules after entering the test writing system (Moodle system exam interface, available at https://exam.sze.hu). It is not possible to accept the rules from 6:00 am on the day of each test until midnight on the given day.

The tests last 90 minutes, each test consists of 4 practical examples to solve and 5 theoretical questions to answer.

10 points can be obtained for each correct solution of examples, 2 points can be obtained for each correct answer to the questions. So 50 points can be obtained for each test at the best.

Each test is succesful only if 25 points are obtained at least. On the last week of the semester there is another attempt to pass each test that was unsuccesful, just before defining the grade.

The retake test may be attended by a student whose semester tests are successful, but they want to improve their previous results. If the student has two results from the same tests, the better result is counted.

All the tests going to be written on the exam.sze.hu platform. The solutions of the examples should be written in to the appropriate text-box. The theoretical questions will be asked on the same platform, the correct answers should be selected from the options provided in the test platform.

The semester is failed if at least one test with less than 25 points is remained after all.

If all the test has obtained at least 25 points finally, then the following grades are going to be defined:

Total points	Grade
- 74	fail (1)
75 - 89	pass (2)
90 - 119	satisfactory (3)
120 - 134	good (4)
135 -	excellent (5)

In order to succeed the semester, further two tests can be written in the exam term.

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Obligatory reading: (avaiable at szelearning.sze.hu)

Y. NAKAYAMA - R. F. BOUCHER: Introduction to Fluid Mechanics
John H. Lienhard IV - John H. Lienhard V: A Heat Transfer Textbook
Joseph M. Powers: Lecture Notes on Thermodynamics

Recommended reading: (only in hungarian)
Dr. Író Béla - Dr. Zsenák Ferenc: Műszaki Áramlástan I. és II.
elektronikus jegyzet, BSc, Széchenyi István Egyetem
Dr. Író Béla - Dr. Zsenák Ferenc: Műszaki Hőtan
elektronikus jegyzet, BSc, Széchenyi István Egyetem

Misc
Materials needed to learn the subject can be found at the NEPTUN Meet Street and szelearning.sze.hu platform.