Óbuda University, Bánki Donát Faculty of Mechanical and Safety Engineering			**Institute of Mechatronics and Vehicle Engineering**
Lecture name and Neptun code: Selected Parts of Thermo- and Fluid-Dynamics **BMXHVE1MNF** **Credits: 3** **Course type:** Full-time **Period:** 1st semester			
Master course: Mechanical Engineering			
Lecturer:	Endre Ruszinkó, professor	**Practice:**	
Number of sessions/week/term: Weekly	Lecture: 2		Practice: 0
Exam/ course assignment: Midterm mark		**Language:** English	
Course objective			
Goal of the course: The subject aims to give a statistical view of the thermodynamic processes occurring in gases.			
Thematics: The statistical analysis of thermodynamic processes.			

	Subjects	
Weeks	**Lectures**	**Practices**
1	Basic elements of the probability theory in the context of thermodynamic problems I – probability, complete system of events, equally possible events..	
2	Basic elements of the probability theory in the context of thermodynamic problems II – independent events, conditional probability, binomial distribution, the Stirling formula.	
3	Main properties of the continuous probability distribution utilized in thermodynamics: continuous variables, mean value, and dispersion.	
4	The application of Poisson and Gauss distributions for ideal gases.	
5	Gas particles' spatial distribution. Fluctuations.	
6	Stern experiment. Maxwell–Boltzmann distribution. Conditions: isotropy of the momentum phase space, independence of momentum vector components.	
7	Deriving the Maxwell–Boltzmann distribution. Normalization. The mean value of the particle momentum.	
8	The inspection of the Maxwell-Boltzmann distribution with respect to the probability of light velocity.	
9	Velocity and kinetic energy distribution.	
10	Particle flux, particle flux intensity: ordered motion, ideal gases (chaotic motion of molecules).	
11	Maxwell–Boltzmann distribution application for the analytic description of particle flux.	
12	Entropy of a gas in terms of statistical analysis.	
13	Test	

14	Re-Test	

Semester week	**Test**
6th	First test
14th	Second test
Course assessments: Week No. 6 and Week No. 14 tests in writing. You have to fulfill the requirements of the tests in writing in the 7th and 14th weeks (both tests need to be minimum pass marks) and participate in lecture and practice classes. Evaluation happens by scoring. The tasks are theoretical and practical. Participation in the practices is mandatory. The midterm mark is calculated using the average test results. Midterm mark=(Tes1+Test2)/2 Intervals of the grade: under 50%: 1 (unsatisfying) 50-62,5 %: 2 (pass mark) 62,5-75 %: 3 (satisfactory mark) 75-87,5 % 4 (class) 87,5-100% 5 (Excellence) In the case of an unsatisfying midterm mark, you can take a midterm grade replacement exam.	

The supplement's method: You can take a midterm grade replacement exam only once, set by the tutor, in the first 10 days of the exam period, with the payment of the examination fee. This is a writing exam covering the whole curriculum. The examination method is writing.

Compulsory literature

- W. Greiner, L. Neise, H. Stöcker: Thermodynamics and Statistical Mechanics, 2nd Edition, Springer, 1994.
- Herbert B. Callen: Thermodynamics and an Introduction to Thermostatistics, John Wiley & Sons, 1985.
- J.R. Howell and R.O. Buckius Fundamentals of Engineering Thermodynamics, McGraw-Hill, 1992.
- Callen: Thermodynamics and an Introduction to Thermostatistics, Wiley, 1985.
- Plischke and Bergersen: Equilibrium statistical physics, World Scientific, 1994.

Quality assurance methods of the subject:

- The standard of theoretical and practical education is annually reviewed at an institution's conference based on the feedback of the teachers and students. They assess the subject's success and make suggestions for necessary changes to maintain the interaction between theory and practical training.

Endre Ruszinkó
Subject Leader
Lecturer