General Information:

Name of Course: **FUNDAMENTAL LAWS, EQUATIONS AND MODELS 2 (TRANSPORT PROCESSES)**

Course Code: IVB289ANVM
Semester: **2nd**
Number of Credits: 4 (5)
Allotment of Hours per Week: 2 Lectures +1 Seminar/Week
Evaluation: Signature and grade
Prerequisites: **None**

Instructor: **Dr. Gergely Nyitray**
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Introduction, General Course Description:

The aim of this course is to present the basic concepts of physics that students need to know for later courses and future careers. To emphasize that physics is a tool for understanding the real world. To teach transferable problem solving skills. *Classical thermodynamics* is the description of the states of thermodynamic systems at near-equilibrium, that uses macroscopic, measurable properties. It is used to model exchanges of energy, work and heat based on the laws of thermodynamics. *Transport processes* concerns the exchange of mass, energy, charge, momentum and angular momentum between observed systems. Examples of transport processes include *heat conduction*, *fluid flow*, *molecular diffusion* and *electromagnetic radiation*.

Learning Objectives:

Problem-solving skills are central to an introductory physics course, these include:
- Thinking logically and analitically,
- Making simplifying assumptions,
- Constructing mathematical models,
- Using valid approximations,
- Understanding the basic laws of the universe.

Methodology:

- **Lectures**: will give an introduction to the Classical Thermodynamics and Transport processes.
- **Seminar**: focusing each time on some particular problem, in which everyone present is requested to participate.
- **Homework:** The students will receive homework to be prepared.
- **Exams:** Accumulated knowledge is tested on the one hand in during the semester as a written examination: the feature of the exam computational for finding solution for physical problems. In case the exam fails or the student want to improve the result a retake exam will be organized (up to two times). On the other hand students are required to take an oral exam in the examinations period. The student has to answer the question in such a way as to demonstrate sufficient knowledge of the subject to pass the exam.

Schedule:

Week	Topic of lecture
Week 1	Course description, thermodinamic system and surroundings, extensive and intensive parameters, ideal and real gases, gas laws
Week 2	Kinetic theory of ideal gases, law of equipartition, degree of freedom, internal energy
Week 3	Van der Waals equation of real gasses, work done, heat exchange
Week 4	Heat, heat capacity, specific heat, the first law of thermodynamics
Week 5	Isochor, isobaric, isotherm, isentropic process
Week 6	Polytropic processes, the second law of thermodynamics
Week 7	Heat engines, Carnot cycle, Carnot efficiency, Entropy
Week 8	Thermodynamic potentials, Helmholtz free energy, Gibbs free energy
Week 9	Gibbs-Duhem relation, the third law of thermodynamics
Week 10	*Break – no class*
Week 11	Transport processes: fluid flow, Bernoulli Equation, viscosity
Week 12	**exam**
Week 13	Transport processes: diffusion, heat transfer
Week 14	Transport processes: convective heat transfer, radiation
Week 15	**Retake exam** (only if required).

Attendance:

To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Grading:

100% - Writing Exam (WE) during the semester
100% - Oral Exam (OE) during the examination period
Grade - (WE+OE)/2

Grade:	5	4	3	2	1
Evaluation in percents:	89%-100%	77%-88%	66%-76%	55%-65%	0-49%

Students with Special Needs:

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:

Gambiattista, Richardson, Richardson: “College Physics” McGraw-Hill International Edition 2007
ISBN-13 978-0-07-110608-5