COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2022/2023 SEMESTER SPRING

Course title	Engineering Physics 2
Course Code	**IVB050ANMI**
Hours/Week: le/pr/lab	**2 Lectures, 2 Seminars**
Credits	**6**
Degree Programme	**Computer Science Engineering**
Study Mode	***BSC***
Requirements	**Signature and Exam**
Teaching Period	**Spring**
Prerequisites	**-**
Department(s)	**Automation**
Course Director	**Gergely Nyitray**
Teaching Staff	**Gergely Nyitray**

COURSE DESCRIPTION

A short description of the course (max. 10 sentences).
Neptun: Instruction/Subjects/Subject Details/Basic data/Subject 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 Mechanics deals with bodies at rest and in motion and the conditions of rest and motions when bodies are under the influence of forces. The topics are as follows: Kinematics, Newton's Laws, Forces, Work-Energy Theorem, Constants of motion (Energy, Linear Momentum, Angular Momentum), Multi-particle Dynamics, Rotational Dynamics, Oscillatory Motion, Lagrangian Formalism. 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.

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

Goals, student learning outcome.
Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction

Problem-solving skills are central to an introductory physics course, these include: Thinking logically and analytically, making simplifying assumptions, constructing mathematical models, using valid approximations.

2. COURSE CONTENT

Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content

	TOPICS
LECTURE	1. *topic* Classical Mechanics 2. *topic* Classical Thermodynamics 3. *topic* Fluid Flow, Nonequilibrium Thermodynamics 4. *topic*
PRACTICE	1. *topic* Classical Mechanics 2. *topic* Classical Thermodynamics 3. *topic* 4. *etc.*

LABORATORY PRACTICE	*1. topic* *2. topic* *3. topic* *4. etc.*

DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

LECTURE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Course description, Physics in general Kinematics in 1D,	3-9 [1a]		
2.	Kinematics in 2D	11-26 [1a]		
3.	Dynamics, Laws of Conservations	27-56 [1a]		
4.	Mechanics of a rigid body	57-77 [1a]		
5.	Oscillations	79-94 [1a]	Sample Test 1	Optional
6.	Analytical Mechanics	95-115 [1a]		
7.	Thermodynamic system, Extensive and Intensive Parameters, Ideal and Real gases, gas laws, Internal Energy, Work done, Heat exchange, Heat Capacity, Specific Heat, First Law, Quasi Static Processes (Isochoric, Isobaric, Isotherm, Isentropic, Polytropic)	7-33 [1b] 3-60 [3]		
8.	Heat engines, Carnot Cycle, Carnot efficiency, Entropy, Second Law, Entropy Principle, Thermodynamic Potentials, Third Law	46-58 [1b] 90-117 [3] 148-168 [3]		
9.	SPRING BREAK			
10.	Transport processes: fluid flow, inviscid flow, incompressible flow, vorticity, Euler-equation, Bernoulli Equation	65-74 [1b] [2a]	Sample Test 2 Project Work	Optional Optional (week 15)
11.	Viscous Flow, Pressure drop, Hagen-Poiseuille law, Reynolds number, Barotropic Flow, Navier-Stokes Equation	[2b]		
12.	Entropy Production, the Principle of Minimal Entropy Production	357-400 [3]		
13.	**Final Exam**			
14.	Summary	[1-3] [4]		
15.	Retake Exam			

PRACTICE, LABORATORY PRACTICE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Solving problems related to theory			
2.	Solving problems related to theory			
3.	Solving problems related to theory			
4.	Solving problems related to theory			
5.	Solving problems related to theory			
6.	Solving problems related to theory			
7.	Solving problems related to theory			
8.	Solving problems related to theory			
9.	SPRING BREAK			
10.	Solving problems related to theory			
11.	Solving problems related to theory			

12.	Solving problems related to theory			
13.	**Final Exam**			
14.	Summary			
15.	Retake Exam			

3. ASSESSMENT AND EVALUATION

(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)

ATTENDANCE

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.

Method for monitoring attendance *(e.g.: attendance sheet / online test/ register, etc.)*

Attendance Sheet

ASSESSMENT

Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.

Course resulting in mid-term grade *(PTE TVSz 40§(3))*

Mid-term assessments, performance evaluation and their ratio in the final grade

Type	Assessment	Ratio in the final grade

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

The specific regulations for improving grades and resitting tests must be read and applied according to the general Code of Studies and Examinations. E.g.: all tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

Grade calculation as a percentage

based on the aggregate performance according to the following table

Course grade	Performance in %
excellent (5)	85 % …
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

Course-unit with final examination

Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam

Mid-term tests are not compulsory, they are just for practice.

Type	Assessment	*Weighting as a proportion of the pre-requisite for taking the exam*
1. Sample Test 1 (optional)		*0%*
2. Sample Test 2 (optional)		*0 %*

3. Project Work (optional)		*0%*

Requirements for the end-of-semester signature

(Eg.: mid-term assessment of 40%)

According to the ***general Code of Studies and Examination*** students must be present for 70% of contact hours. Even with a medical certificate, the 30% limit cannot be significantly exceeded. **If a student misses more than 30% of the contact hours the course is automatically considered to be failed** (and the end-of-semester signature is denied)**. In this case, no re-takes will be possible.** Due to the spring break, the maximum number of weeks is only 14. The medical certificate does not exempt students from attending classes.

Re-takes for the end-of-semester signature (PTE TVSz 50§(2))

The specific regulations for grade betterment and re-take must be read and applied according to the general Code of Studies and Examinations. E.g.: all the tests and the records to be submitted can be repeated/improved each at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

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Type of examination *(written, oral):*

Accumulated knowledge is tested on the one hand, during the semester as a written exam: the students have to solve physical problems. These problems will be computational tasks (final exam). On the other hand, project work can be given and their solutions are also acceptable. It is very important to emphasise that **the results of the project work should be reported orally**. This means that the **students must be able to answer the questions connected to the project work** asked by the lecturer. **Failing this, the project work will not be accepted even if the solution is correct**. Submitting a project work is not compulsory, but if successfully completed is equivalent to the final exam. In case the exam fails or the student wants to improve the result a retake exam will be organised (up to two times). **The first retake exam will be scheduled for week 15. The last one will be held in the first week of the examination period.** If someone's performance (during the semester) is better than 40% the student may receive a final grade (or improve it during the examination period).

The exam is successful if the result is minimum 40 %.

Calculation of the grade *(TVSz 47§ (3))*

The mid-term performance (Sample Tests) accounts for *0* %, the performance at the exam accounts for *100* % in the calculation of the final grade. Successfully completed project work is equivalent to the final exam.

Calculation of the final grade based on aggregate performance in percentage.

Course grade	Performance in %
excellent (5)	85 % …
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

4. SPECIFIED LITERATURE

In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)

COMPULSORY READING AND AVAILABILITY

[1.a] Gergely Nyitray: “Fundamental Laws, Equations and Models I”, ISBN-13 978-0-07-110608-5, available online
[1.b] Gergely Nyitray: “Fundamental Laws, Equations and Models II”, ISBN 978-963-429-348-4, available online
[2] The Feynman “Lectures on Physics”, available online: https://www.feynmanlectures.caltech.edu/
[2.a] The Feynman “Lectures on Physics”, available online: https://www.feynmanlectures.caltech.edu/II_40.html
[2.b] The Feynman “Lectures on Physics”, available online: https://www.feynmanlectures.caltech.edu/II_41.html
[3.] Dilip Kondepudi, Ilya Prigogine: “Modern Thermodynamics”, Wiley 2015 ISBN 9781118371817

RECOMMENDED LITERATURE AND AVAILABILITY

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