COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2025/2026 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
PRACTICE	1. *topic* Classical Mechanics 2. *topic* Classical Thermodynamics
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]	Homework1	Weak2
2.	Kinematics in 2D	11-26 [1a]	Homework2	Weak3
3.	Dynamics, Laws of Conservations	27-56 [1a]	Homework3	Weak4
4.	Mechanics of a rigid body	57-77 [1a]	Homework4	Weak5
5.	Oscillations	79-94 [1a]	Homework5	Weak6
6.	Analytical Mechanics	95-115 [1a]	Homework6	Weak7
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]	Homework7	Weak8
8.	Heat engines, Carnot Cycle, Carnot efficiency, Entropy, Second Law, Entropy Principle	46-58 [1b] 90-117 [3]	Homework8	Weak10
9.	**SPRING BREAK**			
10.	Thermodynamic Potentials, Third Law, Maxwell's relations	148-168 [3]	Homework9	Weak11
11.	Transport processes: fluid flow, inviscid flow, incompressible flow, vorticity, Euler-equation, Bernoulli Equation	65-74 [1b] [2a]	Homework10	Homework12
12.	Viscous Flow, Pressure drop, Hagen-Poiseuille law, Reynolds number, Barotropic Flow, Navier-Stokes Equation	[2b]		Submission of Homework (1-10) in detailed form
13.	**Exam**		**Exam**	
14.	Retake Exam		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.	SPRING BREAK	-	-	-
13.	**Exam**		**Exam**	
14.	**Retake Exam**		**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-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%)

Students are required to attend 70% of contact hours (9 lectures and 9 seminars). To avoid any misunderstanding, we must declaire that having a medical certificate does not exempt students from attending classes**.** Starting from the first week, homework will be assigned every week (except for the spring break), and students will have one week to complete it. The final result must be submitted as a normal message via Teams system within one week (before the lecture). Each correct homework is worth 3 points. In case of an incorrect solution, there is one more opportunity to resubmit it (within two days). **Any abuse or cheating will result in a penalty of (-3) points per task**. **In the 12th week, detailed solutions (in handwritten form) to all homework problems must be submitted to the instructor during the seminar. If a given solution is missing or not clearly written or unclear, the previously awarded points may be lost! All students must obtain a minimum of 18 points out of 30. Otherwise, the course cannot be completed** but the end of semester signature can be obtained**. Homework is assigned at the beginning of the lecture, absentees (including latecomers) will fail the weekly task with 0 points.**

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):*

The conditions for taking the exam are as follows: sufficient number of class attendance (9 lectures, 9 seminars) and obtaining 18 points by completing homework assignments. Accumulated knowledge is tested on the one hand, during the semester as a written exam: the students have to solve physical problems (**only electronic calculators are allowed**). These problems will be computational tasks. 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). On the other hand, project work can be given and their solutions are also acceptable. **Submitting a project work is not compulsory, but if successfully completed is equivalent to the final exam**. Very important: if a student chooses a project work submission, the correct solution is only a necessary, but not a sufficient condition for completing

the course. The necessary condition means that the correct solution of the project work is the prerequisite for the oral report. The solutions must be sent to the instructor as a normal Teams message. If the solutions are correct, the student may present his/her solution orally. This means that the **students must be able to answer the questions connected to the project work** asked by the lecturer. The student must demonstrate that he/she understands the logical steps of his/her own solution. **Failing this, the project work will not be accepted even if the solution is correct**. In case the exam fails or the student wants to improve the result a retake exam will be organized (up to two times). **The first retake exam will be scheduled for week 1 in the examination period. The last one will be held in 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)	86 % …
good (4)	71 % ... 85 %
satisfactory (3)	56 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

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