

# COURSE SYLLABUS AND COURSE REQUIREMENTS

## ACADEMIC YEAR 2023/2024 SEMESTER AUTUMN

<b>Course title</b>	<i>Basic Laws Equations and Models 1</i>
<b>Course Code</b>	MSB288AN
<b>Hours/Week: le/pr/lab</b>	2 Lectures, 2 Seminars
<b>Credits</b>	4
<b>Degree Programme</b>	Electrical Engineering
<b>Study Mode</b>	BSC
<b>Requirements</b>	Signature and Exam
<b>Teaching Period</b>	Fall (Autumn)
<b>Prerequisites</b>	-
<b>Department(s)</b>	Automation
<b>Course Director</b>	Gergely Nyitray
<b>Teaching Staff</b>	Gergely Nyitray
<b>Hours/Week: le/pr/lab</b>	2 Lectures, 2 Seminars

### 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 emphasise that physics is a tool for understanding the real world. To teach transferable problem solving skills. Physics is the branch of science that describes matter, energy, space, and time in the most fundamental level. Physicists look patterns in the physical phenomena that occur in the universe. The goal is to find the most basic laws that govern the universe and to formulate those laws in the most precise way possible. The topics are the following: Kinematics, Newton's Laws, Forces, Work-Energy Theorem, Conservation of Energy, Conservation of Momentum, Multi-particle Dynamics, Rotational Dynamics, Conservation of Angular Momentum, Oscillatory Motion, Lagrangian Formalism.

### 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
<b>LECTURE</b>	<ol style="list-style-type: none"> <li>1. <i>topic</i> Physics in General: Laws, Theorems, Unified Theorems, Units, Dimensions</li> <li>2. <i>topic</i> Classification of Mechanics, Kinematics in 1D</li> <li>3. <i>topic</i> Kinematics in 2D, circular motion, projectile motion</li> <li>4. <i>topic</i> Newton's axioms, Law of inertia, Second Law, inertial frames, Third Law, constraints</li> <li>5. <i>topic</i> Work-energy theorem principle of conservation of mechanical energy, Power</li> <li>6. <i>topic</i> Laws of conservation, collision of two bodies</li> <li>7. <i>topic</i> Mechanics of a rigid body, rotation, moment of inertia, torque</li> <li>8. <i>topic</i> Problems connected with rolling objects, rolling and skidding</li> <li>9. <i>topic</i> Oscillations I: simple harmonic motion, kinematic, dynamics, energy</li> <li>10. <i>topic</i> Oscillations II: damped oscillations, forced oscillations</li> <li>11. <i>topic</i> Lagrangian formalism, Lagrange's equation, Hamilton's equations, Phase plane</li> <li>12. <i>topic</i> <b>Final Exam</b></li> <li>13. <i>topic</i> Retake Exam</li> </ol>

<b>PRACTICE</b>	1. <i>topic</i> 2. <i>topic</i> 3. <i>topic</i> 4. <i>etc.</i>
<b>LABORATORY PRACTICE</b>	1. <i>topic</i> 2. <i>topic</i> 3. <i>topic</i> 4. <i>etc.</i>

## DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

### LECTURE

<i>week</i>	<b>Topic</b>	<b>Compulsory reading; page number (from ... to ...)</b>	<b>Required tasks (assignments, tests, etc.)</b>	<b>Completion date, due date</b>
1.	Physics in general	3-9 [1]		
2.	Kinematics in 1D	11-16 [1]		
3.	Kinematics in 2D	16-26 [1]		
4.	Dynamics I	27-42 [1]		
5.	Dynamics II	42-51 [1]	Sample Test 1	optional
6.	Laws of Conservations	51-56 [1]		
7.	Mechanics of a rigid body I	57-74 [1]		
8.	Mechanics of a rigid body II	75-77 [1]		
9.	Oscillations	79-94 [1]	Project Work	optional (week 14)
10.	Analytical Mechanics I	95-115 [1]	Sample Test 1	optional
11.	Practicing for the Exam			
12.	<b>Final Exam</b>			
13.	Retake Exam			
14.				
15.				

### PRACTICE, LABORATORY PRACTICE

<i>week</i>	<b>Topic</b>	<b>Compulsory reading; page number (from ... to ...)</b>	<b>Required tasks (assignments, tests, etc.)</b>	<b>Completion date, due date</b>
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.	<b>Final Exam</b>			
13.	Retake Exam			
14.				
15.				

## 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. If late, attendance may be refused.

## 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.

**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.

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**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%)

If the number of class absences does not exceed 30% of the contact hours. **It follows that any freshman student must attend the course in person no later than the fourth week of the course. If this is not done for any reason, the course cannot be completed and no further discussion will take place.** To avoid any misunderstanding, we must declare that having a medical certificate does not exempt freshman students from attending classes. **In case the student repeats the course (for the second or third time), I exempt him/her from the course attendance if the student has previously obtained the end-of-semester signature.** Of course, attendance is still an advantage in such cases.

### **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.*

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.

### **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. 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's 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 13. 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.] Gergely Nyitray: "Fundamental Laws, Equations and Models I", ISBN-13 978-0-07-110608-5, available online

### **RECOMMENDED LITERATURE AND AVAILABILITY**

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