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

Course title	*Mechanics II - Dynamics*
Course Code	MSB257AN-EA-00, MSB257AN-GY-01
Hours/Week: le/pr/lab	1/2/0
Credits	4
Degree Programme	Civil Engineering BSc
Study Mode	Full-time schedule
Requirements	Exam
Teaching Period	Semester 6
Prerequisites	
Department(s)	Civil Engineering Department
Course Director	Dr Vanda Olimpia Pomezanski
Teaching Staff	Dr Adél Len

COURSE DESCRIPTION

A short description of the course (max. 10 sentences).
Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description

The course gives an introduction into the fundamentals of dynamics: kinematics of the particle and of the rigid body, Newtonian mechanics, theorems of power and work, theorems of energy and conservation of energy, and collisions as initial starting points of vibrations. Dynamics gives a solid base for further civil engineering courses, like Structural dynamics and Vibrational systems.

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

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

During the lectures the students learn the theoretical foundations, definitions, formulae and various dynamical processes; during the practice they get familiar with the application of the theory, they get experience in solving problems and calculating various physical and mechanical quantities.

2. COURSE CONTENT

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

	TOPICS
LECTURE	1. *topic: Introduction to Dynamics* 2. *topic: Kinematics of the particle (Fundamental concepts: Particle, Path, Degree of Freedom, Velocity, Speed, Acceleration, Graphical interpretation of kinematic quantities, Low of motion, Special types of motion)* 3. *topic: Kinematics of the rigid body (Fundamental concepts: Rigid body, Degree of freedom, Angular velocity, Kinematic pair of vectors, Reduced formula, Angular acceleration, Classification of motions: Instantaneous and finite motions)* 4. *topic: Kinetics of the particle (Axioms of Newton, Dynamics quantities, Moments of dynamic quantities, Basic law of dynamics, Conservation laws, Constrained motion)* 5. *topic: Kinetics of the rigid body (Newton's axioms for rigid body, Low of dynamics for rigid bodies, Planar motion)* 6. *topic: Collisions (Centric collisions, Non-centric collisions, Maxwell-graph)*
PRACTICE	1. *topic: Introduction to dynamics - introductory exercises* 2. *topic: Kinematics of the particle - exercises* 3. *topic: Kinematics of the rigid body - exercises* 4. *topic: Kinetics of the particle - exercises*

	5. topic: Kinetics of the rigid body - exercises 6. topic: Collisions: centric collisions, non-centric collisions, Maxwell-graph - exercises

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
2.	Introduction to Dynamics. Kinematics of the particle (Fundamental concepts: Particle, Path, Degree of Freedom, Velocity, Speed, Acceleration, Graphical interpretation of kinematic quantities, Law of motion, Special types of motion)	[1] page 5 – 18	Mathematical review [1] page 72 – 82	
4.	Kinematics of the rigid body (Fundamental concepts: Rigid body, Degree of freedom, Angular velocity, Kinematic pair of vectors, Reduced formula, Angular acceleration, Classification of motions: Instantaneous and finite motions)	[1] page 19 - 31		
6.	National feast day			
8.	Kinetics of the particle (Isaac Newton, Axioms of Newton, Dynamic quantities: force, linear momentum, derivative of linear momentum)	[1] page 32 - 36		
10.	Kinetics of the particle (Moments of dynamic quantities: moment of the force, angular moment, kinetic moment, Basic law of dynamics, power of the force, Work of the force, Conservation laws: conservation of the linear moment, conservation of the angular moment, conservation of mechanical energy, Constrained motion	[1] page 37 - 49		
13.	Kinetics of the rigid body (Newton's axioms for rigid body, Low of dynamics for rigid bodies, Planar motion)	[1] page 50 - 61		
14.	Collisions (Centric collisions, Non-centric collisions, Maxwell-graph)	[1] page 62 - 71		

PRACTICE

week	Topic	Compulsory reading; page number (from … to …)	Required tasks (assignments, tests, etc.)	Completion date, due date
2.	Kinematics of the particle - exercises	[1] page 5-13, [4] 02_Practice.ppt	Homework exercises: [4] 02_Practice.ppt	Week 4.
4.	Kinematics of the rigid body - exercises	[1] page 19 – 31 [4] 04_Practice.ppt	Homework exercises: [4] 04_Practice.ppt	Week 8.
6.	National feast day			
8.	**Midterm exam (Kinematics of the particle – solution of exercises)** Kinetics of the particle – introductory exercises	[1] page 32 – 36 [4] 08_Practice.ppt	Homework exercises: [4] 08_Practice.ppt	Week 10.
10.	Kinetics of the particle - exercises	[1] page 37 – 49 [4] 10_Practice.ppt	Homework exercises: [4] 10_Practice.ppt	Week 12.
13.	Calculation of the mass moment of inertia of a cylinder	[1] page 50 – 61 [4] 13_Practice.ppt	Homework exercises:	Week 14.

	Kinetics of the rigid body - exercises		[4] 12_Practice.ppt	
14.	Collisions - exercises	[1] page 62 – 71 [4] 14_Practice.ppt	Homework exercises: [4] 14_Practice.ppt	Week 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

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 weighting as a pre-requisite for taking the final exam

(The samples in the table to be deleted.)

Type	Assessment	*Weighting as a proportion of the pre-requisite for taking the exam*
1. Homework exercises (6 homework)	*Accepted or not*	
2. Mid-term exam (practice – solution of exercises)	*max. 100 points*	*100 %*

Requirements for the end-of-semester signature

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

6 accepted homework exercises. Mid-term exam of 40%.

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.

1st week of the exam period

Type of examination *(written, oral):* *Multiple choice test (theory) and written exam (solution of exercises)*

The exam is successful if the result is minimum 40 %. *(The minimum cannot exceed 40%.)*

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

The mid-term performance accounts for ***40*** %, the performance at the exam accounts for ***60*** % in the calculation of the final grade.

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] Adél Len (2021): *Mechanics II. Dynamics – lecture notes*, University of Pécs, Faculty of Engineering and Information technology, Pécs – Availability: uploaded to the Teams group

RECOMMENDED LITERATURE AND AVAILABILITY

[2] J.L. Meriam, L.G. Kraige (2003): Engineering Mechanics, Dynamics, Editor: John Wiley and Sons, Availability: https://oxvard.files.wordpress.com/2018/05/engineering-mechanics-dynamics-7th-edition-j-l-meriam-l-g-kraige.pdf

[3] Herbert Goldstein, Charles Poole, John Safko (2014): Classical Mechanics, Editor: Pearson, Availability: https://dokumen.tips/documents/classical-mechanics-3rd-edition-goldstein-pool-safko.html?page=2 (An edition from 1980 is found in the Library of the PTE Faculty of Sciences)

[4] Len Adél: Mechanics II. Dynamics – ppt slides of the theoretical lectures and practices, Availability: uploaded to the Teams group