STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Mechanics	

Field of study	Profile of study (general academic, practical)	Year /Semester
Mathematics in Technology	**general academic**	**2/3**
Elective path/specialty	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**

Cycle of study:	Form of study (full-time, part-time)
First-cycle studies (Polish Qualifications Framework level six)	**full-time**

No. of hours	No. of credits
Lecture: **30** Classes: **30** Laboratory: **-** Project/seminars: **-**	**4**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
major	**University-wide**

Education areas and fields of science and art	ECTS distribution (number and %)
Technical sciences	**4 100%**
Technical sciences	**4 100%**

Responsible for subject / lecturer:

PhD. Eng. Małgorzata A. Jankowska
e-mail: malgorzata.jankowska@put.poznan.pl
phone. +48 61 665-20-69
Faculty of Mechanical Engineering and Management
Jana Pawła II 24, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	1. A basic knowledge from the fields of mathematics, physics and mechanics. [K_W01 (P6S_WG), K_W05 (P6S_WG)]
2	**Skills**	1. The ability to solve basic problems of mechanics. 2. The ability to work alone, self-study and broaden knowledge based on available literature. [K_U05 (P6S_UW), K_U06 (P6S_UW), K_U14 (P6S_UO)]
3	**Social competencies**	1. An understanding of the importance and impact of sciences on the development of technology. [K_K02 (P6S_KK)]

Assumptions and objectives of the course:

1. Gaining a basic knowledge of mechanics within the scope specified in the study program.
2. The ability to solve basic problems from the field of mechanics.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. In-depth knowledge of three branches of classical mechanics, i.e., statics, kinematics and dynamics. [K_W05 (P6S_WG)]

Skills:

1. Solving of the problems of mechanics with analytical methods. [K_U05 (P6S_UW)]
2. The use of acquired knowledge in modeling of mechanical problems. [K_U05 (P6S_UW)]
3. Acquiring information from literature, databases and other available sources of knowledge. [K_U06 (P6S_UW)]
4. The ability to work individually and in a team. The ability to estimate the time needed for the implementation of the task ordered. [K_U14 (P6S_UO)]
5. The ability to self-study, including to improve professional and social competences. [K_U15 (P6S_UU)]

Social competencies:

1. Awareness of the limits of one's own knowledge and understanding the need for further education. [K_K01 (P6S_KK)]
2. Precise formulation of questions used to deepen one's own understanding of a given topic or finding missing elements of reasoning. [K_K02 (P6S_KK)]

Assessment methods of study outcomes

Lectures
Written exam verifying a knowledge and a proper understanding of the concepts of mechanics.

Exercises
Written exams verifying proper solving of the mechanical problems with analytical methods.

Course description

Overview of the scope of classical mechanics. Introduction to kinematics and dynamics (statics and kinetics). Characteristics of basic concepts such as: models of real bodies (material point, perfectly rigid body), forces and types of forces depending on their nature and origin, a balance of forces. The principles of statics with examples.

Part 1. Statics.

A definition of a degree of freedom (numbers of degrees of freedom for a material point and a rigid body in a plane and a space), a concept of external and internal forces, constrains (classification and types) and supports. Introduction to systems of forces in a plane and in a space. Finding a resultant of forces. Varignon's theorem. The concept of a moment of a force about a point, a couple of forces and a moment of a couple. Equilibrium conditions and equations of a planar and a space force system.

Part 2. Kinematics.

Particle kinematics. Kinematic equations of motion and trajectory (path) of motion. Motion, velocity and acceleration of a particle in Cartesian and natural coordinate systems.

Kinematics of a rigid body. Rotational motion. Planar motion. Velocity and acceleration of points of a rigid body.

Composite motion of a material point. Relative and absolute velocity and acceleration. The Coriolis acceleration.

Part 3. Dynamics.

Dynamics of a material point. Newton's second law. Equations of motion. Simple and reverse problems of dynamics.

Work, power, potential of a force field. The work–energy principle. The principle of conservation of mechanical energy. The momentum conservation principle. The conservation of angular momentum.

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Basic bibliography:

1. J. Leyko. Mechanika ogólna. Część 1 i 2. Wydawnictwo naukowe PWN. Warszawa 2002.
2. J. Misiak. Mechanika techniczna. Statyka i wytrzymałość materiałów. Tom 1. Wydawnictwa Naukowo-Techniczne. Warszawa 2006.
3. J. Misiak. Mechanika techniczna. Kinematyka i dynamika. Tom 2. Wydawnictwa Naukowo-Techniczne. Warszawa 1999.
4. W. Biały. Metodyczny zbiór zadań z mechaniki. Wydawnictwa Naukowo-Techniczne. Warszawa 2004.

Additional bibliography:

1. J. Misiak. Zadania z mechaniki ogólnej. Część 1, 2 i 3. Wydawnictwa Naukowo-Techniczne. Warszawa 1994.
2. J. Nizioł. Metodyka rozwiązywania zadań z mechaniki, Wydawnictwa Naukowo-Techniczne. Warszawa 1978.
3. M.E. Niezgodziński, T. Niezgodziński. Zbiór zadań z mechaniki ogólnej, Wydawnictwo naukowe PWN. Warszawa 1997.

Result of average student's workload

Activity	Time (working hours)
1. Lectures (15x2h = 30 h).	30
2. Exercises (15x2h = 30 h).	30
3. Learning at home before exercises and self-study (10x0.5h = 5h).	5
4. Learning at home before exams (4x3h = 12h).	12
5. Contact with teacher (3h).	3
6. Learning at home before exam and participation in the exam (18h + 2h = 20h).	20

Student's workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	65	3
Practical activities	30	1