STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Modelling of Physical Systems**		Code **1010602211010642212**
Field of study **Transport**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 1**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **1** Classes: **1** Laboratory: **-** Project/seminars: **-**		No. of credits **2**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences**		ECTS distribution (number and %) **2 100%**

Responsible for subject / lecturer:

prof. dr hab. inż. Janusz Mielniczuk
email: janusz.mielniczuk@put.poznan.pl
tel. 61 665 2335
Wydział Maszyn Roboczych i Transportu
ul. Piotrowo 3, 60-965 Poznań

Responsible for subject / lecturer:

Msc. eng. Maciej Berdychowski
email: maciej.berdychowski@put.poznan.pl
tel. 61 224 4516
Wydział Maszyn Roboczych i Transportu
ul. Piotrowo 3, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of mathematics, materials science, mechanics, basics of machine design, theory of machines and strength of materials acquired during the first degree studies.
2	**Skills**	Basics of vector and tensor analysis, solve simple problems of strength, the ability to solve differential equations.
3	**Social competencies**	Students are creative and consistent in the implementation of the tasks has autonomy to solve problems, acquire and improve their knowledge and skills.

Assumptions and objectives of the course:

Learning a new mathematical apparatus necessary in the process of modeling materials and machines (mechanisms), learn the basics of physical and mathematical modeling of construction materials, machinery and equipment, some physical processes.

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

Knowledge:

1. Has a basic knowledge of the mechanics of solids and discrete systems with many degrees of freedom. - [K2A_W02]
2. Mathematical modeling of physical and mechanical systems based on the principle of d'Alembert and Lagrange equations, mathematical description of materials with constitutive equations. - [K2A_W02]

Skills:

1. Can use the assimilated knowledge of the mechanics of construction materials for the simulation of mechanical systems, mechanisms and machines. - [K2A_U05]
2. Is able to use acquired mathematical theories to create and analyze simple models - [K2A_U14]

Social competencies:

1. Understands the need and knows the possibilities of lifelong learning, knows the need for acquiring new knowledge for professional development. - [K2A_K01]
2. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions in short and long-term aspect. - [K2A_K02]
3. Is able to act in a professional manner, comply with the rules of professional ethics and respect for cultural diversity. - [K2A_K03]
4. Has a sense of responsibility for one?s own work and is willing to comply with the principles of teamwork and taking responsibility for collaborative tasks - [K2A_K04]

Assessment methods of study outcomes

Written exam

Course description

Notes on modeling - a goal of modeling. The modeling process - stages of modeling scheme. Physical modeling simplifying assumptions physical quantities, examples of physical models. Mathematical modeling of the base model, tensors , coordinate systems, principles for the formulation of constitutive compounds

Solving the equations of motion of mechanical systems. Mathematical models of construction materials one-parameter models, complex models, some models nonclassical. Mechanical systems one and two-parameter equation of motion, undamped and damped oscillations, resonance, self-excited oscillations, vibrations of beams and shafts. Mathematical models of selected processes thermal systems, hydrodynamic systems. The analogy between the worlds of physical.

Basic bibliography:

1. Ostrowska-Maciejewska; Podstawy mechaniki ośrodków ciągłych, PWN, Warszawa 1982
2. W. Flügge; Tensor analysis and continuum mechanics, Springer-Verlag, Berlin 1972
3. R. H. Cannon jr.; Dynamika układów fizycznych, WNT, Warszawa 1973

Additional bibliography:

1. Z. Parszewski; Drgania i dynamika maszyn, WNT, Warszawa 1982
2. R. Scanlan, R. Rosenbaum; Drgania i flatter samolotów, PWN, Warszawa 1964
3. W. Tarnowski; Modelowanie systemów, Wyd. Politechniki Koszalińskiej, Koszalin 2004

Result of average student's workload

Activity	Time (working hours)
1. Participation in the lecture	15
2. Consolidation of the lecture	8
3. Consultations	5
4. Preparation for the test	5
5. Exam	2
6. Participation in exercises	15
7. Consolidation of the lecture	5
8. Consultations	2
9. Preparation for the test	2
10. Test	2

Student's workload

Source of workload	hours	ECTS
Total workload	61	2
Contact hours	41	2
Practical activities	0	0