

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Modelling of Physical Systems</b>		Code <b>1010615311010642212</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>Refrigerated Transport</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>9</b> Classes: <b>9</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b> <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Berdychowski Maciej email: maciej.berdychowski@put.poznan.pl tel. 612244512 Faculty of Transport Engineering ul. Piotrowo 3 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	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	<b>Skills</b>	Basics of vector and tensor analysis, solve simple problems of strength, the ability to solve differential equations.
3	<b>Social competencies</b>	Students are creative and consistent in the implementation of the tasks has autonomy to solve problems, acquire and improve their knowledge and skills.
<b>Assumptions and objectives of the course:</b> 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.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 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 - [K2A_W02]		
<b>Skills:</b> 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]		
<b>Social competencies:</b> 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]		

<b>Assessment methods of study outcomes</b>		
Written exam		
<b>Course description</b>		
<p>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</p> <p>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.</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>Ostrowska-Maciejewska; Podstawy mechaniki ośrodków ciągłych, PWN, Warszawa 1982</li> <li>W. Flügge; Tensor analysis and continuum mechanics, Springer-Verlag, Berlin 1972</li> <li>R. H. Cannon jr.; Dynamika układów fizycznych, WNT, Warszawa 1973</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>Z. Parszewski; Drgania i dynamika maszyn, WNT, Warszawa 1982</li> <li>W. Tarnowski; Modelowanie systemów, Wyd. Politechniki Koszalińskiej, Koszalin 2004</li> <li>R. Scanlan, R. Rosenbaum; Drgania i flatter samolotów, PWN, Warszawa 1964</li> </ol>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Lectures	9	
2. Strengthening the lecture	8	
3. Consultations	2	
4. Preparation to pass the exam	5	
5. Participation in the exam	2	
6. Participation in the exercises	9	
7. Consolidation of the exercises	9	
8. Consultations	2	
9. Preparation for the test	8	
10. Test	2	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	58	2
Contact hours	26	1
Practical activities	0	0