GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer design of machines (3D), PG_00005421		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Machine Design and Vehicles -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Leszek Dąbrowski	
	Teachers	dr inż. Rafał Gawarkiewicz	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	30	0.0	0.0	30

Subject objectives	The ability of structural analysis of machine parts in terms with Finite Elements Method (FEM). Getting to know the steps and elementar methods applied in professional calculation systems and classic mechanical problems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U06] is able to use mathematical and physical models for analysing the processes and phenomena occurring in mechanical devices within the range of material strength, thermodynamics and fluid mechanics	uses measurement data describing the behavior of the material in the various stages of processing	[SU4] Assessment of ability to use methods and tools
	[K6_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion	presents structural conclusions from the calculation results	[SU5] Assessment of ability to present the results of task
	[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle	uses multi-step calculation procedures for different machine operating conditions	[SW3] Assessment of knowledge contained in written work and projects
	[K6_W11] possesses knowledge on design, technology and manufacturing of machine parts, metrology, and quality control; knows and understands methods of measuring and calculating basic values describing the operation of mechanical systems, knows basic calculating methods applied to analyse the results of experiments	uses material and construction node models	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	Methods of describing the shape in FEM programs. Methods for the automatic distribution of a geometric model construction for shell and solid elements. The possibilities and advantages of the parametric description of a geometric model, and load support in a FEM model. The course analyzes the state of stress and linear stiffness assessment, differences in the use of linear, surface and volume elements. Models of plasticity of material and its description in FEM program. The method of load limit disclosure. The method of taking into account the impact of strain on the stiffness (taking into account large deformations). Goals and possibilities of co-modeling many of parts of the machine. Discussion of the elements of contact and procedures for the detection range of the contact. Possibility to include friction in the model of numerous parts of the machine and methods of friction results observation in the calculations. Distributed load and mass forces modeling capabilities. Running sample programs in ANSYS APDL computing system, describing FEM models illustrating the thesis of the lecture.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	six projects	17.0%	100.0%

Recommended reading	Basic literature	Zagrajek T., Krzesiński G., Marek P.: Metoda elementów skończonych w mechanice konstrukcji. Ćwiczenia z zastosowaniem systemu ANSYS. Oficyna Wydawnicza Politechniki Warszawskiej 2005
	Supplementary literature	-
	eResources addresses	Uzupełniające http://www.kkiem.mech.pg.gda.pl/oacm/kwpi/ - Course Website

Example issues/ example questions/ tasks being completed	Self-building of six individual computing tasks related with: 1. solid modeling, 2. parametric modeling, 3. modeling study of shell stability loss, 4. modeling with the model of a plasticity, 5. contact model of two parts, 6. improving the design based on the results of the calculation results in a graphical environment.
Work placement	Not applicable