GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of machine design II for Management and Production Engineering, PG_00050257		
Field of study	Management and Production Engineering, Management and Production Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Machine Design and Vehicles -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Szymon Grymek	
	Teachers	dr hab. inż. Szymon Grymek dr inż. Sebastian Grelik-Urbanowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	30.0	0.0	60

E-learning hours included: 0.0

Adresy na platformie eNauczanie:
Podstawy konstrukcji maszyn II dla ZiIP, W/C/P, sem. 04, letni 21/22 (PG_00050257) - Moodle ID: 22302
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22302

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	60	9.0	81.0	150

Subject objectives

Familiarization with methods of estimate of safety and reliability of technical system.
Familiarization with elements and assembles commonly used in machines, especially with structure and operation principles of screw connections, spring elements and mechanical gearings.
Familiarization with basics of project methodology. Skill to prepare technical project of simple mechanical device.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U05	Student is using analitical, simulation and experimental methods for formulating and solving problems in the production engineering.	[SU5] Assessment of ability to present the results of task
K6_K01	Student uses graphic editor. Student analyses phenomena in technical systems, especially in machine elements or sub-assembles. Student explains basics of project methodology.	[SK5] Assessment of ability to solve problems that arise in practice
K6_W02	Student creates and uses calculation models for construction of machines. Student constructs simple machine elements - strut or bar type and connections of elements. Student evaluates the safety of structure for immediate and fatigue strength. Student recognises elements and assembles commonly used in machines. Student recognises materials used in machines. Student explains structure and operation principles of welded connections, screw connections (bolts, nuts, etc.), elastic connecting elements and mechanical transmission.	[SW1] Assessment of factual knowledge

Subject contents

LECTURE
Holistic approach to effect of loading actuating mechanical system. Formulation and analysis of problem, creating of modell. Modelling and optimization of connections in machine design. Screw connections (bolts, nuts, etc.). Formation of characteristic of elastic connecting elements. Springs, elastomeric elements (joints, silent-blocks). Computer aided design of springs. System approach to mechanical transmission. Gearings, belt transmission, chain transmission, continuous variable transmission. Systems for changing rotation into linear movement (and vice-versa). Fullfilment of requirments and limitations. Methods of rating and selection of solution variants. Energy saveing transmission. Seals. Data basis for gearing. Reliability and safety of technical systems - and them importance for holistic approach to project process.
EXERCISE
Immediate and fatigue strength. Safety coefficient. Engineering calculations for immediate and fatigue strength. Modelling and optimization of connections in machine design. Welded connections. Screw connections (bolts, nuts, etc.). Springs.
PROJECT
Project exercise consists design of simple mechanical device. Especially important is holistic approach to project process. Student creates several conceptions, chooses criteria and validates conception. Student uses ingeneering calculations (with computer aided design too) and prepares drafts.

Prerequisites and co-requisites

Knowledge of Technical drawings, Informatics, Material science, Mechanics, Strength of materials, Casting and forming, Machining, Welding, Electrotechnics and electronics.
Competence for sketching, drawing and use of graphic editor - efficient to create technical documentation.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercise during auditorium work	100.0%	4.0%
Midterm colloquium	56.0%	12.0%
Written examination	56.0%	60.0%
Project	100.0%	24.0%

Recommended reading

Basic literature	Kochanowski M.: Podstawy konstrukcji maszyn. Wybrane zagadnienia. Gdańsk: P. Gdańska 2002. Osiński Z., Bajon W., Szucki T.: Podstawy konstrukcji maszyn. Wyd. PWN.
Supplementary literature	Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Praca zbiorowa. (Zbiór skryptów opracowanych w Katedrze Konstrukcji i Eksploatacji Maszyn PG) Wyd. Politechniki Gdańskiej. Podstawy Konstrukcji Maszyn. Cykl monografii wydawanych przez PWN. Kurmaz L. W., Kurmaz O. L.: Projektowanie węzłów i części maszyn. Kielce: Wydawnictwo Politechniki Świętokrzyskiej. Przykłady obliczeń z podstaw konstrukcji maszyn (pod. red. Mazanek E.). Warszawa: Wyd N-T 2008.
eResources addresses	Podstawy konstrukcji maszyn II dla ZiIP, W/C/P, sem. 04, letni 21/22 (PG_00050257) - Moodle ID: 22302 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22302

Example issues/ example questions/ tasks being completed	Engineering calculations for immediate and fatigue strength. Calculation of the safety coefficient. Modelling and optimization of connections in machine design. Calculation of the welded connections. Calculation of the screw connections (bolts, nuts, etc.). Calculation of the spring.
Work placement	Not applicable