

# Fundamentals of Engineering Design I - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Fundamentals of Engineering Design I
Kod przedmiotu	06.9-WM-ER-ZiIP-25_18
Wydział	<a href="#">Wydział Mechaniczny</a>
Kierunek	WM - oferta ERASMUS
Profil	-
Rodzaj studiów	Program Erasmus
Semestr rozpoczęcia	semestr zimowy 2019/2020

Informacje o przedmiocie	
Semestr	1
Liczba punktów ECTS do zdobycia	5
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr inż. Wojciech Babirecki

Formy zajęć					
Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	15	1	-	-	Egzamin
Projekt	30	2	-	-	Zaliczenie na ocenę

## Cel przedmiotu

Transfer of basic knowledge of the field of engineering design. To familiarize students with the identification of components and machine parts, general knowledge of the construction and principles of operation of components and subassemblies of machines such as: connections, couplings, gears, flexible components, bearings, etc. Another goal of the subject is to learn the basic principles of calculation and design of basic machine elements.

## Wymagania wstępne

Technical drawing, Mechanics, Strength of materials, 2D engineering graphics, Science of materials

## Zakres tematyczny

### Lecture

Basic terms and definitions. Models of the design and construction process. Principles of construction. Technological construction. Normalization, typization and unification of parts and assemblies. Rational selection of materials. Rational shaping of parts. Contemporary models of the design and construction process. The course of the design and construction process. Concurrent engineering. The main differences between the concurrent and the "traditional" model of the design process. Costs, quality and time in concurrent design. Directories of relative costs. Welded, riveted, interference, grooved, splined, pin, bolt, wedge and screw joints - principles of construction, calculations: rules for the selection of all types of connections, the advantages and disadvantages of individual models. Supporting structures. Flexible elements. Tasks of susceptible elements, construction, principle of operation. Bearings and bearings: types of bearings, selection, shaft bearings, axes and shafts, principles of calculation and construction. Fixing elements, seals. Screw mechanisms: types of screw mechanisms, principle of operation, construction. Clutches and brakes: tasks of clutches and brakes, types, construction, principle of operation. Gears. Belt, chain and friction gears. Types of gears: construction and operation principle, disadvantages and advantages, design features. Principles of practical use of theoretical knowledge during the implementation of a specific weldment design.

### Project

In the project classes, students (in groups of 2 people) carry out the design of a welded construction, which is a welded pressure vessel. Issues in class include:

- Determining the main dimensions of the tank (tank diameter, length or height of the cylindrical part); preliminary selection of construction details - sketching
- Calculations of the cylindrical part and bottom of the tank, selection of materials for the cylindrical part and ends
- Designing of tank supports, selection of dimensions and materials for individual tank elements
- Calculation of hole reinforcements in the tank's shell and bottoms
- Preparation of the construction documentation of the tank
- Preparation of technical and operational documentation (DTR) of the tank

## Metody kształcenia

**Lecture:** conventional lecture, demonstration.

**Project:** group work, discussion, brainstorming, ideas exchange, computer work.

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
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Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
It has theoretically well-founded, detailed knowledge related to selected issues in the field of designing mechanical machines and devices, mechanical systems and manufacturing systems using Mechanical Engineering methods.		<ul style="list-style-type: none"> <li>egzamin - ustny, opisowy, testowy i inne</li> <li>projekt</li> </ul>	<ul style="list-style-type: none"> <li>Wykład</li> <li>Projekt</li> </ul>
The student is able to obtain information from literature, databases and other properly selected sources in the field of Fundamentals of Engineering Design, is able to integrate and interpret acquired information.		<ul style="list-style-type: none"> <li>obserwacja i ocena aktywności na zajęciach</li> <li>projekt</li> </ul>	<ul style="list-style-type: none"> <li>Wykład</li> <li>Projekt</li> </ul>
The student is able to identify and formulate the specification of simple engineering tasks of a practical nature of Fundamentals of Engineering Design field.		<ul style="list-style-type: none"> <li>obserwacja i ocena aktywności na zajęciach</li> <li>projekt</li> </ul>	<ul style="list-style-type: none"> <li>Projekt</li> </ul>
The student has a structured, theoretically founded general knowledge, covering key issues from the Fundamentals of Engineering Design in the field of Management and Production Engineering.		<ul style="list-style-type: none"> <li>egzamin - ustny, opisowy, testowy i inne</li> </ul>	<ul style="list-style-type: none"> <li>Wykład</li> </ul>
Has basic knowledge in the design of machine elements, construction record and FMD (Fundamentals of Machine Design) as an engineering discipline related to Management and Production Engineering.		<ul style="list-style-type: none"> <li>egzamin - ustny, opisowy, testowy i inne</li> <li>projekt</li> </ul>	<ul style="list-style-type: none"> <li>Wykład</li> <li>Projekt</li> </ul>
The student can - in accordance with the given specification - design a simple device in the field of Fundamentals of Engineering Design using the right methods, techniques and tools.		<ul style="list-style-type: none"> <li>projekt</li> </ul>	<ul style="list-style-type: none"> <li>Projekt</li> </ul>

## Warunki zaliczenia

**Lecture:** Exam

The condition for obtaining a positive grade is to get at least 60% of the possible points.

**Project:** Credit with grade.

The condition for passing is the implementation of the project, using appropriate methods and techniques. During the course of the project, the student has to identify simple engineering tasks, solve them for the necessary information from the literature.

**Final rating:**

The final grade is the sum of two component evaluations with the following weighting factors:

exam grade - 0.6, project grade - 0.4.

## Literatura podstawowa

1. M. Dietrich, red., PKM – tom I, II, III, WNT, Warszawa 1999,
2. L. W. Kurmaz, PKM – projektowanie, PWN, Warszawa 1999,
3. R. Knosala, A. Gwiazda, A. Baier, P. Gendarz, PKM – przykłady obliczeń, WNT, Warszawa 2000,
4. W. Juchnikowski, J. Żółtowski, PKM pomoce do projektowania z atlasem, oficyna wydawnicza Politechniki Warszawskiej, Warszawa 1990.

## Literatura uzupełniająca

1. K. Szewczyk, Połączenia gwintowe, PWN, Warszawa 1991,
2. K. Ferenc, J. Ferenc, Konstrukcje spawane – projektowanie połączeń, WNT, Warszawa 2000,
3. A. Biegus, Połączenia śrubowe, PWN, Warszawa 1997,

## Uwagi

Zmodyfikowane przez dr inż. Wojciech Babirecki (ostatnia modyfikacja: 09-05-2019 14:05)

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