SYLLABUS

Name: Design of technological processes for sustainable production
Name in Polish: Projektowanie procesów technologicznych zrównoważonej produkcji
Name in English:

Information on course:

Course offered by department:	Faculty of Organisation and Management
Course for department:	Silesian University of Technology
Study level and form:	I st. full-time studies, 5 i 6 sem. Management of sustainable consumption and production
Term:	Winter semester and summer semester, 2025/2026
Coordinator of course edition:	dr inż. Arkadiusz Boczkowski

Default type of course examination report:

ZAL

Language:

English

Strona WWW:

ECTS:

8

Short description:

The purpose of the course is to familiarize the student with the methodology of designing technological processes of typical parts of machinery and equipment and other technical objects depending on the volume of production and the machinery park owned, with particular emphasis on the element of sustainable production.

Description:

Lecture

1. General knowledge of process design Manufacturing process. Design documentation. Tasks of the designer and technologist. Production program. Means of production.
2. Basic definitions related to the technological process flow. Assumptions and input information for the design of the technological process. Structure of the technological process. Technological documentation (technological chart, machining instruction, heat treatment instruction, quality control instruction, etc.) Designation of tools, measuring instruments, machine tools, workstations, etc.
3. Rodzaje półfabrykatów. Półfabrykaty z materiałów hutniczych, półfabrykaty spajane, z tworzyw sztucznych, odlewy, odkuwki, wykroje, półfabrykaty otrzymywane drogą obróbki plastycznej na zimno, przez spiekanie proszków metali. Kryteria doboru prefabrykatów. Techniki wytwarzania.
4. Elements of production planning and preparation. Technical preparation of production (TPP). Technologicality of design. Conditions limiting the design of the technological process. Examples of technological processes of selected machine components.
5. Selected issues of machining. Machining accuracy, types and causes of errors during machining. Preparation and organization of production and production processes. Structures of production organization.
6. Selected methods and techniques to support the efficiency of the technological process (Lean manufacturing, Just in time).
7. Flexible production systems. Elements of production control. Aspects of production management.
8. Sustainable production, theoretical basis and practical aspects

Project

As part of the project, students develop a process design for a multi-stage shaft for medium/multi-batch production. They make calculations of the minimum diameters of the shaft, select cross sections, make a technical drawing of the shaft and design the technological process (operations and procedures). They then develop complete technological documentation.

Laboratory:

In the lab, students prepare a technological process for machining a simple machine component and develop a program for a CNC machine tool using, for example, G-code and a simple CNC simulator to visualize and check the effects of the machine tool.

Classes for semester 5
Number of hours of classes with direct participation of an academic teacher: 60 hours, including:
lecture - 30 hours, project - 30 hours, exam
Student's own work - 90 hours,
including: preparation for the lecture credit, implementation of the project, preparation for the exam
Total number of hours: 150
Number of ECTS points: 5

Classes for semester 6
Number of hours of classes with direct participation of an academic teacher: 60 hours, including:
lecture - 30 hours, laboratory - 30 hours
Student's own work - 30 hours,
including: preparation for the completion of the lecture and laboratories
Total number of hours: 90
Number of ECTS points: 3

Bibliography:

1. Warren D. Seider, J. D. Seader, Daniel R. Lewin: Product and Process Design Principles: Synthesis, Analysis, Wiley 2020
2. Harmsen J.: Product and Process Design: Driving Innovation. Walter De Gruyter Inc, 2018.
3. Franco, Tiago; Costa, Beatriz: Product Design Process, Imaginary Cloud Limited, 2019
4. Feld M: Podstawy projektowania procesów technologicznych typowych części maszyn. WNT Warszawa 2009.
5. Feld M.: Projektowanie i automatyzacja procesów technologicznych części maszyn. WNT Warszawa 1994.
6. Rutkowski A.: Części maszyn, WSiP 1998,
7. Okoniewski S.: Technologia maszyn. WSiP 1998.
8. Feld M.: Uchwyty obróbkowe. WNT Waszawa 2002.
9. Brodowicz W., Grzegórski Z.: Technologia budowy maszyn. WSiP, Warszawa 1991.

Learning outcomes:

KNOWLEDGE: knows and understands:
K1A_W1 - Advanced issues in the field of mathematics, physics, statistics and areas of engineering and technical sciences useful for formulating and solving typical engineering tasks.
K1A_W3 - Basic engineering processes and technologies in the life cycle of technical equipment, objects and systems and ways of solving typical engineering tasks, particularly in relation to the organization of production processes and production management.

SKILLS: is able to:
K1A_U1 - Identify, formulate and solve complex and unusual engineering problems related to the field of management and production engineering by applying the principles of engineering, science and mathematics, as well as perform tasks under conditions that are not fully predictable.
K1A_U4 – When identifying and formulating specifications for engineering tasks and solving them:
-select and use analytical, simulation and experimental methods, including computer-aided methods,
-recognize their system and non-technical aspects, including ethical aspects
-make preliminary economic assessment of the proposed solutions and engineering actions taken,
-analyze technology transfer and innovation.
K1A_U6 - Design - in accordance with the given specification – the new and supervise existing objects, production and exploitation processes and systems, using appropriate methods, techniques, tools and materials.
K1A_U9 - Select and use appropriate techniques, skills and modern engineering tools.

SOCIAL COMPETENCE: is ready for:

K1A_K1 - Critical evaluation of knowledge and received content, recognition of the importance of knowledge in solving cognitive and practical problems, and consulting experts in the event of difficulties in solving problems on their own.

Assessment methods and assessment criteria:

The prerequisite for a passing grade in semester 5 is the completion of the project (a prerequisite for admission to the exam) and the successful submission of the exam. The final grade for the course is the arithmetic mean of the above two partial grades.
The prerequisite for a passing grade in semester 6 is the passing of the written lecture colloquium and the passing of the laboratory. The final grade for the course is the arithmetic mean of the above two partial grades.

Practical placement: