COURSE DESCRIPTION CARD - SYLLABUS

Course name
Design of machining and assembly processes [S1ZiIP2>PPOiM]

Course

Field of study
Management and Production Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

5,00

Coordinators

Lecturers

Prerequisites

In terms of knowledge: basic knowledge of materials technology, technical drawing, metrology and manufacturing techniques In terms of skills: ability to use literature (obtaining knowledge from indicated sources) and the Internet In terms of competences: Understanding the need to expand one's competences, readiness to work in teams.

Course objective

Learning the basics of designing technological processes of machining and assembly.

Course-related learning outcomes

Knowledge:
A student who has passed the subject is able to:
- define the concept of machine technology and determine their scope,
- plan the sequence of operations and technological procedures for machine assemblies and subassemblies,
- select machining parameters, tools, machining and fixing fixtures in the cutting process,
- define the concept and divide the technological process into basic and auxiliary components and determine the characteristic features of a technological operation and a technological procedure,
- present the structure of the technical standard of working time and provide methods for determining

the value of its components and determine the components of time used at the workstation,
- list and characterize the methods of assembling machine parts,
- describe the organizational forms of assembly,
- present the methods of connecting parts in the machinery industry.

Skills:
A student who has passed the subject is able to:
- use technological standards to determine the values of machining parameters,
- determine the framework technological process for a selected part included in the assembly (e.g. a gearbox) based on a manufacturing or assembly drawing,
- analyze and correct the manufacturing drawing of a stepped shaft type part in terms of dimensioning, accuracy and surface roughness, machining bases and compliance of markings according to PN,
- develop a technological process for assembling a selected assembly,
- use selected software simulating technological processes,
- use the indicated sources of knowledge with understanding (list of basic literature).

Social competences:
A student who has completed the course can:
-- actively involved in the problem solving on design classes,
-- cooperate with the project team and carry out their assigned duties within the division of labor in a team,
-- have responsibility for own work and for the results of the entire team in the reporting of basic orientation in terms of the whole project.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:
Lecture assessment based on written exam (student's activity will be take into account for final mark). Assignment of grades to percentage ranges of results: <90-100> very good; <80-90) good plus; <70-80) good; <60-70) satisfactory plus; <50-60) satisfactory; <0-50) unsatisfactory.
Laboratory:
Laboratory credit based on a weighted average of grades from completed exercises and the final practical test.
Project:
Development of a technological project for a selected set of machine parts. In order to obtain a positive assessment, the student should demonstrate orientation as to the content and substantive content of the project. This will be verified during the review of the project and the conversation with the student. The student's activity during classes - completing subsequent, assigned tasks on time - will also be taken into account for the final assessment.

Programme content

The program covers theoretical and practical issues related to the organization and technology of machining and assembly processes (according to the topics of individual forms of classes).

Course topics

LECTURE
1. Definitions of basic concepts.
2. Cognitive areas of machine technology.
3. Organizational division of a machine building plant with a full production cycle.
4. Production process in a machine building plant with a full production cycle.
5. Basic and auxiliary components of the technological process.
6. Examples of division of the technological process of an axisymmetric part in a hierarchical system.
7. Principles of standardization of the technological process.
8. Characteristics of assembly methods.
9. Basic technologies used in the assembly of machines and devices.
10. Manufacturability of the structure in the scope of assembly.
11. Modeling the assembly process.

12. Determining the sequence in the assembly process.
PROJECT
Title: "Development of machining and assembly technology"
Project components:
1. Manufacturing drawing of a multi-stage shaft based on a sketch/drawing.
2. Analysis of manufacturability.
3. Selection of shaft material.
4. Analysis of allowances and selection of semi-finished product for the shaft.
5. Concept - plan of the technological machining process.
6. Selection of: machine tools, machining fixtures, tools, machining parameters for selected operations and procedures.
7. Concept of assembly of the selected mechanical component/assembly (including division into assembly units).
8. Selection of methods, ways and sequence of assembly together with analysis of manufacturability with respect to assembly.
9. Selection of the appropriate organizational structure of the process.
10. Standardization of assembly time.
11. Process automation.
LABORATORIES
1. Familiarization with CAM software and discussion of the interface of the selected program.
2. Defining semi-finished products and the zero point.
3. Defining tools and their location in the machine tool magazine.
4. Selecting tools and machining parameters for selected operations and procedures.
5. Defining paths on a two-dimensional plane - 2.5D machining.
6. Machining selected geometric aspects of machine parts (machining pockets, chamfers).
7. Machining of freeform shapes, 5D multi-axis machining.
8. Machining of axially symmetrical elements.
9. Simulation and verification of generated tool trajectories.
10. Generating paths and NC files using various postprocessors.

Teaching methods

Lecture: multimedia presentation illustrated with examples given on the board, solving tasks.
Project: solving practical problems, searching for sources, teamwork, discussion.
Laboratory: working with CAM software, solving practical problems, searching for sources, teamwork, discussion.

Bibliography

Basic:
1. Feld M., Podstawy projektowania procesów technologicznych typowych części maszyn, WNT, Warszawa 2003.
2. Feld M., Projektowanie procesów technologicznych typowych części maszyn, WNT, Warszawa
3. Puff T., Sołtys W., Montaż w budowie maszyn, WNT, Warszawa
4. Poradnik Inżyniera, Obróbka skrawaniem. WNT, Warszawa 2001.
5. Wołk R., Normowanie czasu pracy na obrabiarkach do obróbki skrawaniem. WNT, Warszawa.

Additional:
1. Dobrzański T., Rysunek techniczny maszynowy, WNT, Warszawa 2005.
2. Industrial catalogues.
3. Technology regulations.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	77	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	48	2,00