



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of processing and assembly technologies [S1MiBM2>PTOiM]

### Course

Field of study

Mechanical 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

15

Laboratory classes

45

Other

0

Tutorials

0

Projects/seminars

15

### Number of credit points

5,00

### Coordinators

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### Lecturers

### Prerequisites

Prerequisites in terms of knowledge, skills and social competencies: -- Knowledge: basic knowledge of materials technology, technical drawing, metrology and manufacturing techniques, Skills: ability to use literature (acquiring knowledge from specified sources) and the Internet, Social competencies: understanding the need to broaden their competence, willingness to work in teams.

### Course objective

Learn the basics of designing technological processes of machine parts.

### Course-related learning outcomes

Knowledge:

A student who has completed the course can:

-- define the concept of technology and technology of machines and define areas of concern to the machine technology,

-- refine the basic units of mechanical engineering factory with a full production cycle,

-- define the concept and to divide the technological process at the primary and secondary components and determine the characteristics of operation and treatment technology,

- define structure of technical time standards and provide ways to determine the value of its components and determine the components of the time spent at the workplace,
- list and characterize methods of assembling machine parts,
- describe the organizational forms of assembly,
- present methods of connecting parts in the machinery industry.

#### Skills:

A student who has completed the course can:

- use technological standards to determine the values of machining parameters,
- define the framework technological process for a selected part of the assembly (e.g. a box gearbox) based on the 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 marking compliance according to PN,
- calculate the value of the technical working time standard based on the calculated time values unit and preparatory and finishing
- develop the technological process of assembling the selected assembly
- 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 colloquium or written exam (student's activity will be taken into account for final mark). Mark criteria:

- 3,0 40,0%-55,0%,
- 3,5 55,1%-70,0%,
- 4,0 70,1%- 80,0%,
- 4,5 80,1%-90,0%,
- 5,0 90,1%-100%.

#### Project:

Elaborate a technological project for selected part rotationally symmetric (stepped shaft). The project should be largely carried out on the design class. To obtain a positive assessment of the student should demonstrate the orientation of the content and substantive of the project. This will be verified during the design review and discussions with the student. The final mark will also be taken of student activity during classes - carried out within a further entrusted tasks.

### Programme content

#### LECTURE

##### 1. Definition of basic concepts

- technology,
- machine technology,
- production process,
- technological process etc.

##### 2. Cognitive areas of machine technology

##### 3. Organizational division of mechanical engineering institute with a full production cycle

- Types of departments, branches and organizational units of engineering institute.
- Discussion of the tasks of organizational units included in the production department with special emphasis on processes of straightening, cutting and centering.
- Discussion of the tasks of organizational units included in the branch machining parts with particular emphasis on machining, heat treatment, surface treatment.

- The role of organizational units of the auxiliary department
- Division of service and the role of branches warehouse management, transportation, energy, communications, sanitary-technical and administrative-economic.
- 4. Production process in mechanical engineering institute with a full production cycle
- 5. The basic components of the technological process
  - Technological operation and its characteristics.
  - The treatment technology and its variations.
- 6. Auxiliary components of technological process
  - The division of the treatment technology for cut pass, working movements and elementary shanks
  - Areas of interest and depth analyzes technologist and ergonomist in relation to auxiliary components of the process
- 7. Examples of divisions the technological process part of the part rotationally symmetric in hierarchical configuration
- 8. The principles of standardization of the technological process
  - Defining the concept of technical time standards
  - The basic tasks of technical time standardizations.
  - The factors necessary for the proper determination of the technical time standards.
  - Distribution of time spent at the workplace with a particular focus on the components of working time and breaks.
  - Time standardized and nonstandard
  - Scheme of technical standards and working time rules for determining the value of its components
  - Definitions of setup time, cycle time, primary time (machine, machine-manual and manual), complementary and auxiliary.
- 9. Characteristics of assembly methods and their scope of application
- 10. Description of organizational forms of assembly in the machinery industry
- 11. Methods of connecting machine parts.

## PROJECT

Title: "Elaborate technological process for part like stepped shaft, bush or plate"

Components of the project (program content):

1. Front page (according to supplied pattern)
2. Output drawing of indicated workpiece part like shaft, bush or plate.
3. Analysis of the correctness of the output drawing in terms of norms and principles of technical drawing.
4. Improved detailed drawing.
5. Production program divided into batches.
6. Selection of the forging stock material (blank or pig) with pig technical drawing (forging, casting, moulding etc.)
7. Process operation sheet (variant for the production of medium series)
8. Instruction sheet for each technological and treatment operations (including heat treatment and technical control) with selection of machining parameters, cutting tools and control-measurement instruments.
9. Calculations of machining parameters.
10. Effort calculation of part manufacturing (determine value of technical time standards)
11. Selection of machine tools and their characterization technology
12. List of tool and equipment
13. Control system - receipt batch products.
14. Technological process of assembly of the assembly, which includes the selected machine part
15. Discussion of the obtained results

## Course topics

none

## Teaching methods

Lecture: multimedia presentation illustrated with examples given on a board, problem solving.  
 Project: 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	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00