



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Planning of manufacturing processes 2

### Course

Field of study

Mechanical engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

12

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

12

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

### 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:

1. Define and generally describe the basic ways of machining surfaces: tubular, cylindrical, flat and contour.
2. Define and describe the components of technological documentation, define the concept of total and intermediate allowance, determine the components of technological quality of the workpiece.
3. Specify types of blanks and pigs used in machine parts manufacturing.
4. Define the concept of economic machining accuracy and provide a general question machining precision batch of objects, among others, in terms of the conditions of occurrence of defects repairable and non-repairable

#### Skills

A student who has completed the course can:

1. Use technology regulations to determine machining parameters
2. Define the framework technological process for selected part like housing based on detailed drawing
3. Analyze and correct detailed drawing for part like housing in terms of dimensioning, accuracy and surface roughness, machining bases and compliance determinations with PN.
4. Calculate the value of technical time standards based on the calculated value of cycle time and setup time.
5. Benefit from an understanding of the identified sources of knowledge (basic bibliography)

#### Social competences

A student who has completed the course can:

1. Actively involved in the problem solving on design classes
2. Cooperate with the project team and carry out their assigned duties within the division of labor in a team
3. 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. Discussion the basic ways of machining surfaces: tubular, cylindrical, flat and contour of basic treatments cylindrical, tubular, flat and shaped with particular emphasis on longitudinal and transverse turning, single knife threading, beam die and die head, hole broaching, making centre, milling flat surfaces, slot milling, short and long thread milling, milling and grinding shaft splines, grinding tubular surfaces center and centerless method.
2. Technological documentation and its components according to production seriality
  - main documents,
  - drawings,
  - documents related to the organization of production
3. The production program of its size and influence on the process
  - definition of production program,
  - types of production,
  - characteristics of the unit production and mass
4. Characteristics of blanks and pigs
  - define the terms of blank and pig iron
  - casting ways and method and their respective application according to the production program, the required dimensional-contour and weight accuracy,
  - forgings and their types and ranges of application depending on the program production, the required dimensional-contour and weight accuracy,
  - pig stamped,
  - pig welded and resistant welded,
  - blanks rolled i drawn,
  - design guidelines for pigs and blanks,



- rules for selection pigs and blanks.
5. Machining allowance total and intermediate allowance
    - total allowance,
    - intermediate allowance,
    - technology regulations of material wear.
  6. Technological quality of workpiece.
  7. Economic accuracy of machining
    - defining the concept of economic machining accuracy,
    - mathematical formulas describing the economic machining accuracy.
    - examples of the economic value of precision machining of shafts, holes, flat and contoured surfaces for roughing, shaping and finishing,
    - graphs describing the dependence of accuracy of the time or cost of machining.
  8. Accuracy of machining a batch of objects
    - graphical representation of the results of measurements items
    - the impact of the constant systematic deviations of the position of the distribution curve
    - Gaussian curve and the impact of the average dispersion of the square of its shape,
    - determine the percentage of repairable and non-repairable deficiencies

## PROJECT

Title: "Elaborate technological process for part like housing"

Components of the project (program content):

1. Front page (according to supplied pattern)
2. Output drawing of indicated workpiece part like housing.
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 material with pig (casting) technical drawing and values for machining allowances
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 like housing (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. Discussion of the obtained results

## 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. Poradnik Inżyniera, Obróbka skrawaniem. WNT, Warszawa 2001.
4. 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	60	4,0
Classes requiring direct contact with the teacher	30	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	30	2,0

<sup>1</sup> delete or add other activities as appropriate