COURSE DESCRIPTION CARD - SYLLABUS

Course name
Machining

Course

Field of study
Product Lifecycle Engineering

Year/Semester
1/2

Area of study (specialization)
-

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Faculty of Mechanical Engineering

Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has basic knowledge in: mathematics, physics, mechanics, materials science.

Course objective

Introducing the characteristics of a modern solutions in terms of subtractive machining, selection of effective manufacturing techniques and machining parameters for the production of various product groups. The student has an idea what technologies dominate in a given product group, what are their advantages and disadvantages.

Course-related learning outcomes

Knowledge

1. Student recognizes the modern tendencies and development directions in a range of subtractive technologies.

2. Student is able to choose the manufacturing techniques and machining parameters for the production of various product groups taking into account the cost and geometric part specification.

3. Student can select the manufacturing technologies appropriate to the expected quality of product performance.

4. Student can prepare a control and supervision plans for manufacturing processes in terms of meeting quality requirements.

Skills

1. Acquiring the information regarding modern manufacturing processes in mechanical engineering, integration of acquired information and their interpretation, as well as formulation of conclusions and ability to justify these statements.

2. Student is able to develop the opinion regarding part's manufacturing technology.

3. Student is able to select the modern subtractive technologies to conduct the manufacturing processes and to improve the manufacturing system's effectiveness by integrating the activities.

4. Student can choose appropriate, to the product specification, technologies to manufacture product parts.

5. Student can plan the layout and production plan and simulate them with the goal of process optimization so as to fulfill customers demand.

6. Student can plan quality inspection tools and systems to check the manufactured products parameters against the design assumptions.

Social competences

Student correctly identifies and solves problems connected with technologist's profession in a range of subject's program.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: exam from the contents presented during the lectures.

Lab: qualification based on appropriate execution of activities and report from the each of the lab activities, according to lecturer's remarks. During the lab, the student's theoretical knowledge related to the activity is being evaluated orally by the lecturer. In order to credit the lab, all activities have to be passed (positive grade from oral answer and reports).

Programme content

Lecture:

1. Kinematic and geometrical aspects of various cutting methods.

2. Characteristics of a modern materials for cutting tools.

3. Physical phenomena occurring during cutting.

4. Technological cutting effects (surface quality, efficiency, costs, tool life).

5. Review of tendencies in machining in relation to various product groups.

6. Selection of technology and machining parameters for various product groups.

7. Machining optimization of various product groups.

Lab:

1. Kinematics and technological aspects of basic cutting methods.

2. Characteristics of tools and tool materials for manufacturing of different product groups.

3. Assessment of the geometric part specification of products manufactured by various machining methods.

4. Assessment of selected technological effects of electro-discharge-machining EDM.

5. Physical effects of machining with a modern cutting edge geometries.

Teaching methods

1. Lecture: multimedia presentation, examples illustrated, discussion and problem analysis.

2. Laboratory: practical classes, problem solving, discussion, teamwork.

Bibliography

Basic

1. Walker J.R., Dixon B. Machining Fundamentals.Goodheart-Wilcox Publisher; 9th Ninth Edition, 2013.

2. Davim J.P., Jackson M.J. Nano and Micromachining. John Wiley & Sons, Inc., NJ USA 2009.

3. Grzesik W., Advanced machining processes of metallic materials, Elsevier, Amsterdam 2017.

4. Dornfeld D., Lee D.E. Precision Manufacturing, Springer, New York 2008.

Additional

1. Tlusty J. Manufacturing Processes and Equipment, Prentice Hall, New York 2000.

2. Gherman L., Gleadall A., Bakker O., Ratchev S. Manufacturing technology: micromachining, [in:] I. Fassi, D. Shipley (eds), Micro-manufacturing Technologies and Their Applications: a Theoretical and Practical Guide, Springer, Cham 2017, 97–128.

3. Królczyk G.M., Maruda R.W., Wojciechowski S. Advances in hard-to-cut materials: Manufacturing, Properties, Process Mechanics and Evaluation of Surface Integrity, MDPI Basel Switzerland 2020.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	20	1,0

[1] delete or add other activities as appropriate