



## Subject card

|   |  |  |   |                                     |   |            |     |
|---|--|--|---|-------------------------------------|---|------------|-----|
| Subject name and code                       | Manufacturing Engineering, PG_00040059   |  |   |                                     |   |            |     |
| Field of study                              | Mechanical Engineering   |  |   |                                     |   |            |     |
| Date of commencement of studies             | October 2021   |  | Academic year of realisation of subject   |                                     | 2023/2024   |            |     |
| Education level                             | first-cycle studies  |  | Subject group   |                                     |   |            |     |
| Mode of study                               | Part-time studies  |  | Mode of delivery  |                                     | at the university   |            |     |
| Year of study                               | 3  |  | Language of instruction   |                                     | Polish  |            |     |
| Semester of study                           | 6  |  | ECTS credits  |                                     | 4.0   |            |     |
| Learning profile                            | general academic profile   |  | Assessment form   |                                     | assessment  |            |     |
| Conducting unit                             | Department of Manufacturing and Production Engineering -> Faculty of Mechanical Engineering and Ship Technology  |  |   |                                     |   |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | dr inż. Piotr Sender  |                                     |   |            |     |
|   | Teachers   |  | dr inż. Bogdan Ścibiorski   |                                     |   |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial  | Laboratory                          | Project   | Seminar    | SUM |
|   | Number of study hours  | 15.0   | 0.0   | 8.0                                 | 8.0   | 0.0        | 31  |
|   | E-learning hours included: 0.0   |  |   |                                     |   |            |     |
| Learning activity and number of study hours | Learning activity  | Participation in didactic classes included in study plan |   | Participation in consultation hours |   | Self-study | SUM |
|   | Number of study hours  | 31   |   | 4.0                                 |   | 65.0       | 100 |
| Subject objectives                          | Student knows machine technology   |  |   |                                     |   |            |     |
| Learning outcomes                           | Course outcome   |  | Subject outcome   |                                     | Method of verification  |            |     |
|   | [K6_U04] is able to perform a critical analysis of the existing technical solutions, present the specification of the technology of manufacturing basic construction elements of machines and engineering assemblies   |  | Designs basic processes technology of typical parts machines  |                                     | [SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU2] Assessment of ability to analyse information  |            |     |
|   | [K6_U08] is able to design a technological manufacturing process for typical elements of machines or devices, using analytical and numerical calculating tools   |  | Describes the principles of design operations and processes technological typical parts machines  |                                     | [SU4] Assessment of ability to use methods and tools  |            |     |
|   | [K6_U09] is able to plan the manufacturing, assembly and quality control processes of typical constructions and mechanical devices, estimating their costs   |  | Describes the principles of design operations and processes technological typical parts machines taking into account the cost of production |                                     | [SU5] Assessment of ability to present the results of task<br>[SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |            |     |
|   | [K6_W11] possesses knowledge on design, technology and manufacturing of machine parts, metrology, and quality control; knows and understands methods of measuring and calculating basic values describing the operation of mechanical systems, knows basic calculating methods applied to analyse the results of experiments |  | Analyzes technological operations in terms of: execution time, accuracy, processing parameters, measurements in machine technology          |                                     | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge   |            |     |

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|--|---|--|-------------------------------|
| Subject contents   | LECTURE The fabrication process and its components. Data for the technological design, documentation, and technical standard time. Selection machining allowance. Design of semi-finished product. Construction producibility. Machining datum surface and rules for determining the items on the machine tools and precision machining. Technological method of constituting the surface layer of machine component and their influence on the exploitation properties. Processes typical of machine components for various types and degree of machining and assembly automation. Process typication. The group technology. Flexible manufacturing systems. Computer aided manufacturing. Programming numerical machine tool and robots. LABORATORY Determination of work standads time. Effect of machining datum surface and method of setting the cutting lathe to shaft machining errors. Analysis of machining process by the burnishing and grinding. The impact of various process on the positioning accuracy hole axis. Technology of cylindrical gear. Analysis of machine sub-assembly. Fundamentals of programming and and machining on CNC machine tools. PROJECT Projects of typical machine elements" processes: shaft and lever. Implementation of technical documentation, selection allowance, equipment, processing parameters, tools. Determination of time technical standard.   |  |                               |
| Prerequisites and co-requisites                                | Knowledge from the chipless forming, machining and machine tools, and metrology.  |  |                               |
| Assessment methods and criteria                                | Subject passing criteria  | Passing threshold  | Percentage of the final grade |
|  | Written exam  | 60.0%  | 60.0%                         |
|  | Project   | 60.0%  | 20.0%                         |
|  | Practical exercise  | 90.0%  | 20.0%                         |
| Recommended reading  | Basic literature  | 1. Feld M.: Projektowanie i automatyzacja procesów technologicznych. PWN W-wa 2018.<br>2. Przybylski W., Deja M.: Komputerowo wspomaganie wytwarzania maszyn. WNT, W-wa 2007.<br>3. Przybylski i in.: Technologia maszyn i automatyzacja produkcji. Laboratorium. Politechnika Gdańska, Gdańsk 2001.<br>4. Cichosz P.: Narzędzia skrawające. WNT, W-wa 2006. |                               |
|  | Supplementary literature  | 1. Obróbka skrawaniem Poradnik inżyniera 1-3, Wydawnictwa Naukowo Techniczne WNT<br><br>2. Olszak W.: Obróbka skrawaniem. WNT, Warszawa, 2008.   |                               |
|  | eResources addresses  | Adresy na platformie eNauczanie:<br>Technologia maszyn (M:31921W0) - Moodle ID: 37242<br><a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=37242">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=37242</a>   |                               |
| Example issues/<br>example questions/<br>tasks being completed | Process design as a basic element of engineering activities. The production process and its components. Data for the technological design process, documentation and technical time standard. Selection of machining allowances, design of semi-finished products, construction technology. Machining bases and rules for determining objects on machine tools and machining accuracy. Technological methods of constituting the surface layer of machine parts and their influence on operational properties. Technological processes of typical machine parts for various types and degrees of automation of machining and assembly. Process typing, group processing and flexible manufacturing systems. Computer-aided manufacturing, programming of numerical machine tools. Determining the technical standard of working time. Influence of machining bases and the method of setting the lathe on errors in machining the shaft. Technological analysis of the shafts finishing process by burnishing and grinding. Application of an industrial robot in technological processes. Basics of programming and machining on CNC machines (lathe and milling machine). Influence of hole technology on the accuracy of spacing their axes. Process designs of typical machine parts, e.g. shaft, lever, gear wheel. Preparation of documentation, selection of allowances, instrumentation, tools, technological parameters of processing, technical standard of working time. |  |                               |
| Work placement   | Not applicable  |  |                               |