



Subject card

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| Subject name and code | Computer-aided manufacturing, PG_00055064 | | | | | | |
| Field of study | Management and Production Engineering | | | | | | |
| Date of commencement of studies | October 2021 | | Academic year of realisation of subject | | 2023/2024 | | |
| Education level | first-cycle studies | | Subject group | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 3 | | Language of instruction | | Polish | | |
| Semester of study | 5 | | ECTS credits | | 5.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Mariusz Deja | | | | |
| | Teachers | | dr inż. Dawid Zieliński dr inż. Piotr Sender dr hab. inż. Mariusz Deja dr inż. Bogdan Ścibiorski | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 0.0 | 15.0 | 15.0 | 0.0 | 60 |
| | 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 | 60 | | 4.0 | | 61.0 | 125 |
| Subject objectives | Learning the basic techniques of computer-aided manufacturing, especially programming CNC machines with the use of CAM software | | | | | | |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K6_W05] has systematized, theoretically founded knowledge of modelling the operation of production systems with various structures and forms of their organization and the analysis of production processes using computer simulation methods | Analysis of the production process using computer simulation for a specific manufacturing system. | [SW3] Assessment of knowledge contained in written work and projects |
| | [K6_K02] is able to interact and work in a group, assuming different roles, can inspire and organize the learning process of others, properly identifies priorities for realization of a task specified by themselves or others | Group design of the technological process with the use of a computer system. | [SK1] Assessment of group work skills |
| | [K6_W09] knows the general principles of creating and developing forms of individual entrepreneurship and stimulating employee creativity, using knowledge in the field of design, production and operation of machinery and technical devices | The manufacturing process selection depending on the class, type of parts, material, dimensional and shape requirements as well as time and cost of production. | [SW1] Assessment of factual knowledge |
| | [K6_U09] can use analytical techniques as well as computer simulation and numerical analysis methods in solving specific problems in the field of production engineering, is able to carry out simple engineering tasks related to the production of typical machine parts using widely understood techniques and computer tools, is able to select and apply appropriate methods of project planning and control courses with the use of computer aided means | The student applies the practical use of CAD/CAM systems to present the designed technology for the production of mechanical components | [SU1] Assessment of task fulfilment |
| | [K6_W03] has knowledge of the design record (the record structure) for the preparation of the manufacturing process documentation and basic knowledge of the implementation and management of production systems, including the principles of designing machine parts and manufacturing technologies using information techniques | The student can design technological processes of typical machine parts for the available means of production, including measuring devices and analysis of experimental results. | [SW2] Assessment of knowledge contained in presentation |
| Subject contents | Systems for computer-aided manufacturing. Integration of CAD and CAM systems. The exchange of data between systems. Declaration of the workpiece, semi-finished product, tools and fixtures. Definition of machining cycle. Types of turning and milling machining cycles. Selection of machining strategy for specific areas treated. Declaration of cutting parameters. Treatment of free surfaces. High speed machining HSM. Databases in CAM systems. Files containing data access tools. Postprocessors machine tool. Simulation with an analysis of collision. Modification of machining programs. Trends in the development of computer aided manufacturing. Additive technologies and reverse engineering. | | |
| Prerequisites and co-requisites | Technical drawing, basics of manufacturing techniques, Computer Aided Design CAD | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Exam | 60.0% | 40.0% |
| | Projects | 60.0% | 20.0% |
| | Active participation in lectures | 80.0% | 20.0% |
| | Practical exercises during laboratories 60.0% 20.0% | 60.0% | 20.0% |
| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Przemysław Kochan. EdgeCAM. Wieloosiowe frezowanie CNC. Wydawnictwo Helion. Gliwice 2014. 2. Grzesik W., Niesłony P., Bartoszek M.: Programowanie obrabiarek NC/CNC. WNT, Warszawa 2020, Wyd. IV. 3. Przybyłski W., Deja M.: Komputerowo wspomagane wytwarzanie maszyn. Podstawy i zastosowanie. WNT, Warszawa 2007. 4. Augustyn K.: EdgeCAM. Komputerowe wspomaganie wytwarzania. Wydanie II. Helion, Gliwice 2006. | |

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| | Supplementary literature | <ol style="list-style-type: none"> 1. Grzesik, W. Advanced machining processes of metallic materials: theory, modelling and applications. Elsevier, 2016. 2. Kosmol J.: Automatyizacja obrabiarek i obróbki skrawaniem. WNT, Warszawa 2000. 3. Chlebus E.: Techniki komputerowe CAX w inżynierii produkcji. WNT, Warszawa 2000. |
| | eResources addresses | <p>Adresy na platformie eNauczenie:</p> <p>Komputerowe wspomaganie wytwarzania (CAM), PG_00055064, ZiIP, 2023/2024, s. zimowy - Moodle ID: 33589 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=33589</p> |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> 1. The range of applications of CAD/CAM manufacturing support systems. 2. Use and integration of CAX techniques. 3. Generating NC programs using the CAD/CAM system. 4. Data exchange - between different systems. 5. Design and technological compliance in computer-aided manufacturing. 6. Object modeling - Feature Modeling. 7. Generating variants of technological solutions. 8. Trends in the development of CAX techniques in the field of computer-aided manufacturing. 9. Integration of CAD / CAM systems with CAE systems. 10. The structure of the standard of working time in terms of computer-aided production. 11. Process planning for turning technology with the use of the CAD/CAM system. 12. Process planning for milling technology with the use of the CAD/CAM system. 13. List the steps to be followed when designing technology using the CAM system (EdgeCam) with the use of 2D models. 14. List the steps to be followed when designing technology using the CAM system (EdgeCam) with the use of 3D models. 15. Designations of the axes of the coordinate system for: turning, milling and designation of additional axes. 16. List the types of models used in CAM systems. 17. List the designs of CNC lathes (positioning of the tool head) and the consequences of tools, spindle revolutions, etc. 18. Characterize the solid models. 19. Characterize the surface models. 20. Present the essential differences between the solid model and the surface model. 21. Characteristics of parametric CAD design. 22. Ways of determining the center of the coordinate system on the workpiece. 23. Ways of determining the blank in CAM systems. 24. Tasks of the technical preparation of production (TPP) department. | |
| Work placement | Not applicable | |