**SYLLABUS**

**regarding the qualification cycle 2024/2025**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | Computer aided design material |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | College of Natural Sciences |
| Name of the unit running the course | Institute of Material Engineering |
| Field of study | Material Engineering |
| Qualification level | I |
| Profile | generally academic |
| Study mode | Full time |
| Year and semester of studies | III year, V semester |
| Course type | directional |
| Language of instruction | Polish/English |
| Coordinator | dr Michał Marchewka |
| Course instructor | dr Michał Marchewka |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester  (n0.) | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | Internships | others | **ECTS credits** |
| 5 |  |  |  | 30 |  |  |  |  | 5 |

1.2. Course delivery methods

- conducted in a traditional way

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

Laboratory: assessment: credit with a grade

2. Prerequisites

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| COMPLETED COURSE BASICS OF PROGRAMMING, KNOWLEDGE OF COMPUTER BUILDING, COMPLETION OF A COURSE IN PHYSICS AND ENGINEERING PHYSICS  CREDIT COURSES: FUNDAMENTALS OF MATERIALS SCIENCE, MATERIALS ENGINEERING, FUNDAMENTALS OF MACHINE CONSTRUCTION. |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

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| --- | --- |
| O1 | Education in the field of computer-aided design material is designed to acquaint students with the principles of selection of engineering materials. Understanding the roles of the material design in engineering design products and processes for their preparation. Students have to know the functional factors, sociological, ecological and economical in engineering design. |
| O2 | They should know the basics of computer Aided design material camd (computer aided materials design) based on autodesk software including autocad and inventor, and methods of numerical simulation of physical phenomena and processes and prediction of properties of materials. Another goal is to understand and use data bases of engineering materials and the use of computer techniques in the study of the structure and properties of materials. Students should be given the skills and competences: material design products with established commercial structure and properties; use techniques of computer science of materials in engineering design and research. |
| O3 | Education in the field of computer-aided design material is designed to acquaint students with the principles of selection of engineering materials. Understanding the roles of the material design in engineering design products and processes for their preparation. Students have to know the functional factors, sociological, ecological and economical in engineering design. They should know the basics of computer |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

|  |  |  |
| --- | --- | --- |
| Learning Outcome | The description of the learning outcome  defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | Able to design 3d solid 2d and 1d systems in the program comsol and inventor. It can locate each object relative to each other with respect to the cartesian system. Comsol multiphysics supports the program and inventor, selects materials with the use of library material library in the program comsol. Assesses and analyzes the effects of design.He can use the database information about the materials used in engineering and computer techniques in the study of the structure and properties of materials.Able to design products with an assumed structure and properties of utility; | im\_u03  im\_u07 |
| LO\_02 | Understands the needs of circuit design built with eco-friendly materials. Able to apply the principles of economic calculation in design.  Is aware of and understands the validity of the non-technical aspects and effects of engineering activities, including its impact on the environment, and the associated responsibility for decisions | IM\_K06 |

**3.3. Course content (to be completed by the coordinator)**

1. Classes, tutorials/seminars, colloquia, laboratories, practical classes

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| Autodesk Inventor: Structure and organization of files, desktop program  Model Browser, Bookmark Tool, Navigation Tool, start menu program. Modeling by extrusion. Modeling by rotation. Modeling the Loft.  Edit item. Create teams.  Animation team  Create teams - Contener Center, Making presentations, Figure 2D mesh analysis in Inventor.  Numerical methods for simulation of physical phenomena and processes and the prediction of properties of materials based on the software COMSOL  Designing simple 3D solids in the program COMSOL, 2D systems, 1D. Principle of separation of 3D solids, separation edges, points, surfaces. The mutual orientation of two or more 3D solids. Principles of building mesh.  Design of complex shapes, ways of combining solids.  Identify and use a variety of materials from the Library Material Library of COMSOL. Design elements composed of different materials. Rules for selection of engineering materials. Sources Information on materials engineering. Information database of engineering materials. Fundamentals of computer science materials  The analysis and test methods bodies made of different materials, simulating the stress on the joints.  Test |

3.4. Methods of Instruction

e.g.

Exercises in the laboratory: performing experiments, designing experiments

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

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| --- | --- | --- |
| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01 | *Exam / Observation during classes / project* | classes |
| LO-02 | *OBSERVATION DURING CLASSES* | classes |

4.2 Course assessment criteria

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| *laboratory - complete all tasks in the exercises, pass two tests,*  *Laboratory - assessment conducted on lab exercises, evaluation of exercise substantial preparation, assessment of knowledge and practical skills to use the available programming of the design.*  *Pass two practical tests involving the design of a specific item using the tools available in the computer lab*  *Grading scale:*  *Dst 51-60% of the points*  *+ dst 61-70%*  *71-80% db*  *+ 81-90% db*  *91-100% bdb* |

5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

|  |  |
| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | Lecture 15 hours  Laboratory 15 hours |
| Other contact hours involving the teacher (consultation hours, examinations) | 5 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 75 |
| Total number of hours | 110 |
| Total number of ECTS credits | 5 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

Not applicable

7. Instructional materials

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| Compulsory literature:  TTP://HELP.AUTODESK.COM/VIEW/INVNTOR/2015/ENU/  2. COMSOL Multiphysics User’s Guide, May 2012r. |
| Complementary literature: |

Approved by the Head of the Department or an authorised person