

SYLLABUS

Name: Designing of medical devices (IBioAIB>SI4DMD23S)

Name in Polish:

Name in English:

Information on course:

Course offered by department: Faculty of Biomedical Engineering

Course for department: Silesian University of Technology

Term: Summer semester 2024/2025

Cordinator of course edition: Dr inż. Magdalena Antonowicz

Dr inż. Ada Orłowska

Default type of course examination report:

EGZ

Language:

English

Course homepage:

<https://platforma.polsl.pl/rib/course/view.php?id=415>

Short description:

The student will learn the principles and criteria of design using CAD systems. The application of CAD graphic software for creating two-dimensional (2D) and three-dimensional (3D) models, as well as for generating technical drawings. The aim of the course is to familiarize students with design principles and the basic tools of AutoCAD, SolidWorks, and Inventor Professional software during the design of medical devices.

Description:

Curriculum Content:

Lecture:

1. Fundamentals of Technical Drawing – Standardized elements (lines, annotations, dimensioning), orthographic projection, and views.
2. Precise Technical Documentation – Sections, layouts, dimensioning, dimensional tolerances, and drawing selected component elements.
3. Working and Assembly Drawings in Technical Documentation.
4. Advanced Technical Documentation.
5. Basic Design Assumptions – Analysis and requirements.
6. Optimization of Design Assumptions – From concept to implementation.

Exercises:

Conducted either in a regular mode or in an e-learning.

Improving skills in using AutoCAD, SolidWorks, and Inventor through the completion of progressively complex design tasks.

1. Practical Use of Modeling Tools – Designing simple implants.
2. Practical Use of Modeling Tools – Designing advanced implants.
3. Creating Parts in the Context of an Assembly.
4. Drawings and Technical Documentation.

Number of Hours with Direct Participation of Academic Teachers or Other Instructors and Students:

1. Lecture: 15 hours
2. Exercises: 90 hours

Number of Hours for Student's Independent Work:

Preparation for Lecture Assessment: 15 hours

Preparation for Exercises Assessment: 15 hours

Total Hours: 135

ECTS Credits: 9

Including ECTS Credits Earned Through Classes with Direct Participation of Academic Teachers or Other Instructors and Students: 9

Bibliography:

1. Shih Randy H.: Learning SOLIDWORKS 2023: Modeling, Assembly and Analysis, SDC Publications, 2023
2. Kęska P.: SolidWorks 2013: modelowanie części, złożenia, rysunki: podręcznik dla osób początkujących i średniozaawansowanych, Warszawa 2013
3. Babiuch M.: SolidWorks 2006 w praktyce, Gliwice, Wydawnictwo Helion, 2007
4. Lombard M.: SolidWorks 2013: Bible The comprehensive tutorial resource, Wiley, 2013
5. Verma G., Weber M.: Mastercam 2017 for Solidworks black book
6. www.solidworks.com
7. Reyes A.: Beginner's Guide to SOLIDWORKS 2020 – Level 1, SDC Publications, 2019
8. Shih R., Schilling P.: Parametric Modeling with SOLIDWORKS 2020, SDC Publications, 2020
9. Tran P.: SOLIDWORKS 2019 Basic Tools, SDC Publications, 2018
10. Reyes A.: Beginner's Guide to SOLIDWORKS 2017 – Level I, SDC Publications, 2017
11. Lombard M.: SolidWorks 2013: Bible The comprehensive tutorial resource, Wiley, 2013
12. Verma G., Weber M.: Mastercam 2017 for Solidworks black book
13. Plachard D.: Official Guide to Certified SOLIDWORKS Associate Exams: CSWA, CSWA-SD, CSWSA-FEA, CSWA-AM (2017-2019), SDC Publications, 2019
14. Rydzanicz I.: Rysunek techniczny jako zapis konstrukcji. Zadania, Wydawnictwo Naukowo- Techniczne, 2009
15. Filipowicz, Krzysztof, Aleksander Kowal, i Mariusz Kuczaj. 2016. Rysunek techniczny. Wydawnictwo Politechniki Śląskiej.
16. Filipowicz, Krzysztof, i Aleksander Kowal. 2004. Rysunek techniczny z ćwiczeniami. Zredagowane przez Roma. Oprac. red. Łoś. Wydawnictwo Politechniki Śląskiej.
17. Czepiel, Józef. 2013. AutoCAD : ćwiczenia praktyczne 2D. Wydawnictwo Politechniki Śląskiej.
18. Montusiewicz, Jerzy, Dziedzic, Krzysztof, Barszcz, Marcin, Urzędowski, Arkadiusz. Komputerowa grafika inżynierska. Ćwiczenia do programu AutoCAD 2023. Politechnika Lubelska, podręcznik.

USOSweb: Szczegóły przedmiotu: IBioAIB>SI4DMD23S, w cyklu: 2024/2025-L, jednostka dawcy: <brak>, grupa przedm.: <brak>

19. Sydor M., Kwella M.: Podstawy CAD, Ćwiczenia w Autodesk Inventor, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu
20. Bordino A.: Autodesk Inventor 2023 Cookbook. PublishDrive.2022

Learning outcomes:

Knowledge

The student knows and understands:

K1A_W09: Knows the capabilities of CAD programs in the field of medical product design. Understands the need for using basic computer-aided engineering tools in the CAD software environment.

K1A_W10: Acquires knowledge of contemporary methods of designing and the principles that guide them.

Skills

The student can:

K1A_U04: Design individual solid elements.

K1A_U07: Create assemblies of advanced sets of individual solids, design medical products.

K1A_U09: Be able to create technical documentation for the project.

Social Competences

The student is ready to:

K1A_K01: Expand their knowledge in the use of CAD software.

K1A_K03: Make informed design decisions, take responsibility for the completed project, and analyze market needs.

Assessment methods and assessment criteria:

Assessment Criteria:

Lecture:

Final written exam consisting of open-ended or multiple-choice questions.

Exercises:

1. completing a task during classes confirming the knowledge of the basics of technical drawing,
2. completing one project in AutoCAD during classes,
3. implementation of four medical device projects during classes in the SolidWorks software.
4. Implementation of four medical device projects during classes in Inventor software.
5. Final tests (Solidworks, Inventor)

Passing Criteria: Successful completion of all projects during the exercise and both final tests.

The final exercise grade is based on the average grade of individual projects (40%) and the average grade of the final tests (60%).

Final Grade Calculation:

The final grade is determined as an average of partial grades:

Lecture (exam) (50%) + Exercises (50%)

Average Score Final Grade

2.0 – 2.75 2.0 (fail)

2.76 – 3.25 3.0 (satisfactory)

3.26 – 3.75 3.5 (satisfactory plus)

3.76 – 4.25 4.0 (good)

4.26 – 4.75 4.5 (good plus)

4.76 – 5.0 5.0 (very good)

Information on course edition:

Default type of course examination report:

ZAL

Bibliography:

missing bibliography in English

Details of classes and study groups

lecture (15 hours)

Study groups details

Group number 1

Class instructors:

Dr inż. Ada Orłowska

Dr inż. Magdalena Antonowicz

inż. Julia Kolasa

classes (90 hours)

Study groups details

Group number 1

Class instructors:

Dr inż. Ada Orłowska

Dr inż. Magdalena Antonowicz

inż. Julia Kolasa

Element of course groups in various terms:

Course group description	First term	Last term
<i>missing group description in English</i> (IBioAIB>SI-4-23-S)	2024/2025-L	

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	9	2024/2025-L	