



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of mass transport vehicles [S1MiBP1>PPTM]

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### Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

4/7

Area of study (specialization)

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Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

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### Number of hours

Lecture

45

Laboratory classes

15

Other

0

Tutorials

15

Projects/seminars

0

### Number of credit points

5,00

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### Coordinators

dr inż. Tomasz Staśkiewicz

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### Lecturers

### Prerequisites

The student has a basic knowledge of the construction of rail vehicles and their role in the modern world. The student is able to use technical drawing and has spatial imagination in order to read, understand and prepare three-dimensional models of technical objects and their documentation. The student is able to use the acquired knowledge to analyze specific phenomena and processes occurring in the operation of rail vehicles. The student is able to solve specific problems that arise during the construction of technical objects. The student is able to work in a group, taking different roles in it. The student is able to determine the priorities important in solving the tasks set before him. The student shows independence in solving problems, acquiring and improving the gained knowledge and skills.

### Course objective

The aim of the course is to learn how to use the CAD SolidWorks program, aimed at designing rail vehicles. Students acquire the ability to make models of single parts, assemblies and technical documentation. Optionally, students can obtain the following certificates: Certified SolidWorks Associate and Certified SolidWorks Professional.

### Course-related learning outcomes

#### Knowledge:

The student has basic knowledge of the basics of machine design and the theory of machines and mechanisms, including mechanical vibrations. Has basic knowledge of the standardized rules of recording structures and engineering graphics. Is aware of the latest trends in machine construction, i.e. automation and mechatronization, automation of machine design and construction processes, increased safety and comfort of operation, the use of modern construction materials. Has extended basic knowledge necessary to understand specialist subjects and specialist knowledge about the construction, construction methods, manufacturing and operation of a selected group of working, transport, thermal and flow machines covered by the diploma path.

#### Skills:

The student can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions. Can search in catalogs and on manufacturers' websites ready-made machine components to be used in his own projects. Can use computer office packages for editing technical texts, including formulas and tables, technical and economic calculations using a spreadsheet and running a simple relational database. Can use integrated with the packages for spatial modeling, programs for the calculation of mechanical structures by the finite element method and correctly interpret their results. Can use popular packages for editing technical drawings and 3D modeling to the extent enabling the creation of drawing documentation in accordance with applicable drawing standards and models of virtual machines in three-dimensional space. Can interact with other people as part of teamwork (also of an interdisciplinary nature). Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.

#### Social competences:

The student is ready to critically assess his knowledge and received content. Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Completion in the form of an online test for which 180 minutes are allocated. An additional component of the final grade in the subject is activity in the classroom and social skills while working in a group, assessed by the teacher.

### Programme content

- using the CAD program interface (adjusting it to user preferences), editing the view position, modifying the graphic representation of the designed object, built-in 3D visualization program tools
- reading technical drawings, creating and modifying 2D sketches, creating adaptive sketches, duplicating operations
- creation of solid elements by the extrusion operation (simple, path, shape and revolution), their modification by cutting operations and the hole wizard, duplicating operations
- creating assemblies of many parts, creating mates between components
- creating technical documentation of designed technical objects, editing the sheet, inserting annotations
- development of the concept of a tram corresponding to the client's requirements and analysis of the kinematic gauge

### Course topics

The course covers mastering the CAD computer aided design tool, including:

1. Sketching
2. Creating parts
3. Creating assemblies
4. Creating drawings
5. Understanding design intent
6. Designing rail vehicle components

## 7. Preparing for the CSWA certification exam

### Teaching methods

Lecture with a multimedia presentation, independent work with computers (Solidworks software), assessment in the form of online tests.

### Bibliography

#### Basic

1. Domański J.: SolidWorks 2014. Projektowanie maszyn i konstrukcji. Praktyczne przykłady (ebook), Wydawnictwo Helion 2015.
2. SolidWorks user manual.
3. Babiuch M.: SolidWorks 2009 PL. Ćwiczenia, Wydawnictwo Helion 2009.

#### Additional

1. Dobrzański T., Rysunek techniczny maszynowy, Wydawnictwo Naukowo-Techniczne 2013.
2. Romaniszyn Z., Podwozia wózkowe pojazdów szynowych, Wydawnictwo Instytutu Pojazdów Szynowych Politechniki Krakowskiej 2010.
3. Podemski J., Marczewski R., Seria Wagony kolejowe.
4. M. Spiryagin, C. Cole, Y. Q. Sun, M. McClanachan, V. Spiryagin, T. McSweeney, Design and Simulation of Rail Vehicles, CrC Press, T&Fr Group.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00