



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of special-purpose vehicles [S1MiBP1>PPSp]

### Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

3/6

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

30

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

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### Lecturers

### Prerequisites

Knowledge: Has basic knowledge of mechanics, basics of machine construction and vehicles construction.

Sills: Student is able to use the basic computer techniques. Social competences: Student is aware of responsibility for his/her own work.

### Course objective

Mastering theoretical and practical knowledge of engineering modeling methods and analysis of special-purpose vehicles in CAD/CAE systems.

### Course-related learning outcomes

Knowledge:

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.

Has basic knowledge of technical thermodynamics, ie the theory of thermodynamic changes, heat flow, thermal machines and heating, drying and cooling devices.

Has basic knowledge of manufacturing techniques used in the engineering industry, such as casting,

forming, reducing and incremental machining, welding and other joining techniques, cutting, coating and surface treatments.

Has elementary knowledge of automation systems, microcontrollers, control algorithms, automatic machines and industrial robots, electronic navigation systems used in machines and wired and wireless communication systems in local computer networks used in machines.

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.

#### Skills:

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 perform elementary technical calculations in the field of fluid mechanics and thermodynamics, such as heat and mass balances, pressure losses in pipelines, select parameters of blowers and fans for ventilation and transport systems, and calculate thermodynamic courses in thermal machines.

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 prepare a technical descriptive and drawing documentation of an engineering task.

#### Social competences:

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.

Is willing to think and act in an entrepreneurial manner.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Lecture - written exam. Laboratory - current reports.

### Programme content

The use of CAD / CAE systems in the aspect of engineering problems. Analysis of calculation examples in the field of modeling vehicle components. Classification of motor vehicles. Special and specialized vehicles - general information. Engineering problems in the design of specialized vehicles.

### Course topics

#### Lecture program

The main concepts and stages of FEM. Types of strength calculations carried out with FEM programs. Characteristics of modeling with the use of bar, surface and solid elements. Structure of a solid model for the purposes of computer simulation runs in terms of generating load cases and engineering analyzes. Specialized vehicles - design solutions and purpose. Bodies of specialized vehicles. Chassis and equipment of specialized vehicles. Self-unloading and self-loading vehicles.

#### Laboratory program

Familiarization with ready-made modules in Inventor to support the design of specialized vehicles.

### Teaching methods

An informative and problematic lecture with a multimedia presentation and a didactic discussion.

Laboratory - design tasks solved in CAD / CAE systems.

### Bibliography

#### Basic

1. Prochowski L., Żuchowski A.: Pojazdy samochodowe. Samochody ciężarowe i autobusy. Wydawnictwo

Komunikacji i Łączności, Warszawa 2006

2. Prochowski L., Żuchowski A., Technika transportu ładunków, WKiŁ, Warszawa 2009

3. Gabrylewicz M. Podwozia i nadwozia pojazdów samochodowych. Cz. 1, Podstawy teorii ruchu i eksploatacji oraz układ przeniesienia napędu /. Warszawa : Wydawnictwa Komunikacji i Łączności, 2010.

4. Gabrylewicz M. Podwozia i nadwozia pojazdów samochodowych. Cz. 2, Układ hamulcowy i kierowniczy, zawieszenie oraz nadwozie. Warszawa : Wydawnictwa Komunikacji i Łączności, 2010.

Additional

1. Zienkiewicz O.C.: Metoda elementów skończonych, Arkady. Warszawa, 2004

2. E. Chlebus, Systemy CAx, WNT, Warszawa 2000.

3. Starkowski D., Bieńczak K., Zwierzycki W., Samochodowy transport krajowy i międzynarodowy.

Kompendium wiedzy praktycznej. T. I Cz. I Wyd. III, Wyd. SYSTHERM, Poznań 2013

### Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 75    | 3,00 |
| Classes requiring direct contact with the teacher                                                                                       | 45    | 2,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30    | 1,00 |