



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Machine science of working machines

### Course

Field of study

Mechanical and Automotive Engineering

Area of study (specialization)

Heavy duty machinery

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

-

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Jaroslaw Selech prof. PP

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Responsible for the course/lecturer:

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### Prerequisites

Knowledge: The student has basic knowledge of the theory of mechanisms, strength of materials, material engineering, technical mechanics and mechanics of dispersed media.

Skills: The student is able to obtain information from the literature on the current state of technology development in the field of construction and operation of agricultural machines.

Social competences: The student is able to cooperate in a group and shows independence in solving problems, acquiring and improving the acquired knowledge and skills.

### Course objective

The role and importance of working machines in technology. Knowledge of construction, principles of operation of working machines, with particular emphasis on earthmoving machines. Classification and



systematics of working machines. Working machines used in agriculture and road construction. Construction, principle of operation and adjustment of working units of complex agricultural machines, earthmoving and road works machines. Determination of efficiency and rules of their use.

### Course-related learning outcomes

#### Knowledge

Has elementary knowledge of electric drives in machines, including three-phase current, AC and DC motors, frequency and voltage converters, power electronics.

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.

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

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 apply basic technical standards regarding unification and safety and recycling.

Can plan and carry out the process of constructing uncomplicated machinery units or machines and formulate requirements for electronic components and automatic control systems for industry specialists in mechatronic systems.

#### Social competences

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 ready to fulfill social obligations and co-organize activities for the benefit of the social environment.

Is ready to fulfill professional roles responsibly, including:

- observing the rules of professional ethics and requiring this from others, - caring for the achievements and traditions of the profession.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Partial grades:

Assessment of student activity during lectures.



Summative assessment:

Assessment taking into account the activity of students during the classes and a written exam on the material

### Programme content

General construction of machines for soil treatment with particular emphasis on agricultural machinery also used in road construction. Solutions of systems of working units and running gear. Machine construction diagrams, i.e. harrows, cultivators, plows, seeders, mowers, rollers.

Construction of hydraulic systems. Application and methods of use of the above-mentioned machines.

### Teaching methods

1. Lecture with multimedia presentation
2. Exercises - solving problems

### Bibliography

Basic

1. Kanafojski C., Karwowski T.: Teoria i konstrukcje maszyn rolniczych. Wyd. PWRiL, Warszawa, 1972.
2. Gach S., Miszczak M., Waszkiewicz C.: Projektowanie maszyn rolniczych. Wyd. SGGW-AR, Warszawa, 1989.
3. Brach J.: Koparki jednonaczyniowe. Wyd. WAT, Warszawa, 1985.
4. Brach J.: Maszyny ciągnikowe do robót ziemnych. Wyd. WNT, Warszawa, 1986.

Additional

1. Dudczak A.: Koparki. Teoria i projektowanie. Wyd. WNT, Warszawa, 2000.
2. Konopka S.: Podstawy budowy i eksploatacji maszyn inżynieryjno-budowlanych. Wyd. WAR, Warszawa, 2002.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	40	2,0

<sup>1</sup> delete or add other activities as appropriate