



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechatronic systems in working machines [S2MiBP1-MR>SMwMR]

### Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

1/2

Area of study (specialization)

Heavy-duty Machines

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

0

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

0

### Number of credit points

1,00

### Coordinators

dr hab. inż. Łukasz Gierz prof. PP  
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### Lecturers

### Prerequisites

Knowledge: Has basic knowledge of the theory of mechanisms, automation, electrical engineering and electronics Skills: Is able to analyze the basic functions of mechatronic components and knows them application Social competences: General communication skills and the ability to work in a team

### Course objective

Providing a general understanding of the essence of mechatronic systems, the scope of their applications systems in present and future technology, especially in the field of working machines

### Course-related learning outcomes

Knowledge:

Has extended knowledge in the field of computer science, concerning computer programming and engineering calculation programs in the field of computer simulation of physical systems.

Has a general knowledge of the principles and methods of constructing working machines, in particular the methods of functional and strength calculations, mathematical optimization of mechanical structures and modeling of machine structures in 3D systems.

He knows the main development trends in the field of mechanical engineering.

#### Skills:

Can write a simple computer program with the use of modern RAD environments in a language known to him for the optimization calculations of structures using learned elementary numerical methods.  
Can perform a medium complex design of a working machine or its assembly using modern CAD tools, including tools for spatial modeling of machines and calculations using the finite element method.  
He can design the technology of exploitation of a selected machine with a high degree of complexity.

#### 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.

It is ready to fulfill social obligations, inspire and organize activities for the benefit of the social environment.

Is ready to fulfill professional roles responsibly, taking into account changing social needs, including:

- developing the professional achievements,
- maintaining the ethos of the profession,
- observing and developing the rules of professional ethics and acting towards the observance of these rules.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Control work or written test

### Programme content

1. On the essence of mechatronic systems;
2. Elements of mechatronic systems. Actuators (motors and drives);
3. Elements of mechatronic systems. Actuators (Cd motors and drives);
4. Elements of mechatronic systems. Sensors;
5. Elements of mechatronic systems. Sensors continued;
6. Mathematical models of mechatronic systems;
7. Microcontrollers and digital technology in mechatronic systems on the selected example;

### Course topics

none

### Teaching methods

1. Lecture with multimedia presentation

### Bibliography

#### Basic

1. Heinmann B. Gerth W. Popp K. Mechatronika. PWN. 2001 (tłum. Z niem).
2. Shetty D. Kolk R. A. : Mechatronics system design PWS Publishing Company 1997.

#### Additional

1. Isermann R. : Mechatronic systems. Springer Verlag 2005.
2. Tarnowski W. Kiczowski T. Kęska W. Ociepa Z. Napędy w urządzeniach mechatronicznych. Politechnika Koszalińska 2015.
3. Praca Zbiorowa red. Jan Szlagowski. Automatyzacja pracy maszyn roboczych. Metodyka i zastosowania

### Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50