COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mechatronics of means of transport [N2Trans1>MwŚT]

Course

Field of study
Transport

Year/Semester
1/2

Area of study (specialization)
Low-emission Transport

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
18

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr hab. inż. Grzegorz Ślaski prof. PP
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Lecturers

Prerequisites

Knowledge of vehicle component systems, their construction, parameters and principles of operation. The ability to specify the initial conditions for the selection of sensors, elements and measurement systems in vehicles. Awareness of responsibility for decisions made in the design process.

Course objective

Getting to know the purposes of application, the idea of operation, structure and operation of selected mechatronic systems in means of transport.

Course-related learning outcomes

Knowledge:
1. Has knowledge of development trends and the most important new achievements of means of transport and other, selected, related scientific disciplines.
2. Knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of transport.

Skills:

1

1. Can assess the usefulness and the possibility of using new achievements (methods and tools) and new products of transport technology
2. Can make a critical analysis of existing technical solutions and propose their improvements (improvements).
3. Can - using, among others conceptually new methods - solve complex tasks in the field of transport engineering, including atypical tasks and tasks with a research component.

Social competences:
1. Understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems.
2. Is aware of the need to develop professional achievements and observing the rules of professional ethics.
3. Understands the importance of popularizing the latest achievements in the field of transport engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Credit on the basis of a written test at the last lecture class.

Programme content

The idea of mechatronic systems. Examples and areas of application of mechatronic systems in means of transport. Control in mechatronic systems - definitions, open and closed control, components of the control system and their roles, the role of the process in control systems as an object of regulation, the idea of feedback, automatic control and modern control methods. Sensors (sensors) in mechatronic systems in means of transport. Actuators (actuators) in mechatronic systems in means of transport. Data and communication in mechatronic control systems in means of transport. Mechatronic active safety systems - ABS, ASR (TCS), ESP (ESC), cruise control and adaptive cruise control, advanced driver assistance systems (ADAS) - automatic emergency braking systems, lane change warning and others. Mechatronics in drive systems - controlling the operation of the engine and its subsystems, washing control of hybrid drives, controlling the operation of electric drives, controlling the operation of clutches and gearboxes, controlling the operation of multi-axis drive systems. Mechatronics in passive safety systems - control systems for gas cushion and seat belt systems. Mechatronics in vehicle comfort systems - control of heating, ventilation and air conditioning systems, seat and window control, etc. Mechatronics in material handling - AGV truck control systems, automatic stacker cranes control systems. Methodology of designing mechatronic power-off systems. Simulation and prototype of mechatronic control systems.

Course topics

Teaching methods

Lecture: multimedia presentation.

Bibliography

Basic
1. Gajek A., Juda Z. Czujniki, Wydawnictwa Komunikacji i Łączności, Warszawa 2011
2. Fryśkowski B., Grzejszczyk E. Systemy transmisji danych, Wydawnictwa Komunikacji i Łączności, Warszawa 2010
3. Herner A., Riehl H.J. Elektrotechnika i elektronika w pojazdach samochodowych, Wydawnictwa Komunikacji i Łączności, Warszawa 2013
4. Konrad Reif Ed., Automotive Mechatronics, Automotive Networking, Driving Stability Systems, Electronics, Springer Vieweg, 2015
5. Bosch informator techniczny, Czujniki w pojazdach samochodowydh: klasyfikacja, główne wymagania, wielkości pomiarowe, zasady pomiarów, przetwarzanie sygnałów, ponad 50 przykładów czujników i układów scalonych, Wydawnictwa Komunikacji i Łączności, Warszawa 2012

Additional
1. Robert Bosch, Czujniki w pojazdach samochodowych, Wydawnictwa Komunikacji i Łączności, Warszawa 2014
2. Bosch, Mokroelektronika w pojazdach samochodowych, Wydawnictwa Komunikacji i Łączności, Warszawa 2017
3. Bosch, Układy bezpieczeństwa i komfortu jazdy: elektrotechnika i elektronika samochodowa - informator technczny, Wydawnictwa Komunikacji i Łączności, Warszawa 2016
4. Bosch, Konwencjonalne i elektroniczne układy hamulcowe, Wydawnictwa Komunikacji i Łączności, Warszawa 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	18	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	37	1,50