# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronics in means of transport [N1Trans1>ElektrwŚT]

## Course

Field of study
Transport

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
part-time

Requirements
compulsory

## Number of hours

Lecture
9

Laboratory classes
9

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

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## Lecturers

## Prerequisites

Basic knowledge of electricity. Knowledge of the structure and principles of operation of basic semiconductor elements, such as diodes, transistors, etc. Basic knowledge of the construction of modern means of transport. Has basic programming skills. Ability to obtain information from diagrams, sketches, technical drawings, charts.

## Course objective

Gaining basic knowledge on the use of electronics in modern means of transport. Understanding the operation of control systems based on sensors and actuators, in particular internal combustion engine control systems, but also broadly understood safety, comfort and environmental protection systems. Acquainting with the principle of operation of basic sensors and actuators used in means of transport. Raising awareness of the necessity to use on-board diagnostic systems and presenting the principles of their operation

## Course-related learning outcomes

Knowledge:
The student has extended and in-depth knowledge of physics useful for formulating and solving selected

technical tasks, in particular for correct modeling of real problems
The student has an ordered, theoretically founded general knowledge of technology, transport systems and various means of transport
The student has knowledge of important development trends and the most important technical achievements and of other related scientific disciplines, in particular transport engineering

Skills:
The student is able to obtain information from various sources, including literature and databases (both in Polish and in English), integrate it properly, interpret it and critically evaluate it, draw conclusions, and comprehensively justify his/her opinion.
The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions
The student is able to design elements in the field of transport engineering and construct simple machines

Social competences:
The student is aware of the social role of a technical university graduate, in particular understands the need to formulate and convey to the society, in an appropriate form, information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the profession of a transport engineer.
The student understands that knowledge and skills very quickly become obsolete in technology.
The student correctly identifies and resolves dilemmas related to the profession of a transport engineer.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Assessment of the student"s preparation for conducting laboratory exercises. Assessment of activity during classes. Assessment of the report from the conducted laboratory exercises. Final written test of the lecture.

## Programme content

Basics of electrical measurements in means of transport. Electronically controlled power supply systems for spark ignition engines. Electronically controlled diesel fueling systems. Electronic equipment of means of transport in terms of safety, comfort and environmental protection. Basics of the data bus. Testing of signals of sensors and actuators of electronic systems of means of transport. The use of electronic systems for the implementation of diagnostics of technical devices. Independent construction and programming of control systems based on a microcontroller.

## Course topics

none

## Teaching methods

1. An informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character.
2. Problem lecture ("internal dialogue" of the lecturer with the student: understanding the problem, gathering premises, solving it).
3. Seminar lecture ("external dialogue" between the lecturer and the student; students participate in solving the problem) - the continuation of the lecture may be a seminar.
4. Working with a book (independent study of literature; non-linear notation recommended, e.g. using the mindmapping method - creating mind maps).
5. Talk (conversation between the teacher and students in the form of questions on his part and students" answers: introductory, informative, consolidating, control, presenting new messages).
6. Classic problem method (feeling of difficulty, formulating a problem, creating hypotheses, verification, summing up students" independent work).
7. Case study method (analysis of a specific case: illustrative - is illustrative; problematic - problem identification; open episode - giving a proposal for action).
8. Demonstration method (presentation of the phases of practical activities) with an explanation

(mechanism of action) or instructions (detailed instructions for implementation).
9. Laboratory (experiment) method (independent conducting of experiments by students).

## Bibliography

Basic
1. Herner Anton, Riehl Hans Jurgen, Elektrotechnika i elektronika w pojazdach samochodowych, WKŁ, Warszawa 2013
2. Bosch, Automotive Electrics and Automotive Electronics, Springer 2014
3. Konrad Reif, Automotive Mechatronics, Springer 2014
Additional
1. Konrad Reif, Fundamentals of Automotive and Engine Technology, Springer 2014
2. Konrad Reif, Gasoline Engine Management, Springer, 2015
3. Konrad Reif, Diesel Engine Management, Springer, 2014
4. Rolf Isermann, Engine Modeling and Control, Springer, 2014
5. Tadeusz Kaczorek, Andrzej Dzieliński, Włodzimierz Dąbrowski, Rafał Łopatka, Podstawy teorii sterowania, Wydawnictwa Naukowo-Techniczne, Warszawa 2005
6. Bosch, Sterowanie silników o zapłonie iskrowym. Zasada działania. Podzespoły, WKŁ, Warszawa 2013
7. Bosch, Sterowanie silników o zapłonie iskrowym. Układy Motronic, WKŁ, Warszawa 2007
8. Bosch, Sterowanie silników o zapłonie samoczynnym, WKŁ, Warszawa 2006
9. Bosch, Układy wtryskowe Unit Injector System/Unit Pump System (UIS/UPS), Warszawa 2014
10. Bosch, Zasobnikowe układy wtryskowe Common Rail, WKŁ, Warszawa 2009
11. Bosch, Czujniki w pojazdach samochodowych, WKŁ, Warszawa 2014
12. Uwe Rokosch, Układy oczyszczania spalin i pokładowe systemy diagnostyczne samochodów OBD, WKŁ Warszawa 2007
13. Bosch, Sieci wymiany danych w pojazdach samochodowych, WKŁ, Warszawa 2016
14. Kozak W.: Fizykochemiczne podstawy regulacji i sterowania silników spalinowych. Wydawnictwo Politechniki Poznańskiej 2011

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 48 | 2,00 |
| Classes requiring direct contact with the teacher | 18 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30 | 1,00 |