**Nazwa przedmiotu:**

Introduction to Mechatronics

**Koordynator przedmiotu:**

Jędrzej Mączak, PhD, DSc

**Status przedmiotu:**

Obowiązkowy

**Poziom kształcenia:**

Studia I stopnia

**Program:**

Electric and Hybrid Vehicles Engineering

**Grupa przedmiotów:**

Obowiązkowe

**Kod przedmiotu:**

1150-PE000-ISA-0390

**Semestr nominalny:**

3 / rok ak. 2022/2023

**Liczba punktów ECTS:**

2

**Liczba godzin pracy studenta związanych z osiągnięciem efektów uczenia się:**

1) Number of contact hours - 32, including; a) lecture - 15 hours; b) laboratory - 15 hours; c) consultations - 2 hours 2) Student's own work - 28 hours, including; a) completing homework assignments: 4 hours; b) preparation for classes (including literature studies): 10 hours; c) preparation for the final colloquium: 10 hours 3) TOTAL - 50 hours

**Liczba punktów ECTS na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich:**

1.3 ECTS point - number of contact hours - 32, including: a) lecture - 15 hours; c) laboratory - 15 hours; e) consultations - 2 hours;

**Język prowadzenia zajęć:**

polski

**Liczba punktów ECTS, którą student uzyskuje w ramach zajęć o charakterze praktycznym:**

1.2 ECTS points - 30 student's work hours, including: a) participation in laboratory exercises - 15 hours, b) preparation of a laboratory report - 5 hours, c) preparation of classes - 10 hours.

**Formy zajęć i ich wymiar w semestrze:**

|  |  |
| --- | --- |
| Wykład:  | 15h |
| Ćwiczenia:  | 0h |
| Laboratorium:  | 15h |
| Projekt:  | 0h |
| Lekcje komputerowe:  | 0h |

**Wymagania wstępne:**

Knowledge of the basics of mechatronics, mechanics, electronics and physics is required.

**Limit liczby studentów:**

In accordance with the Rector's order

**Cel przedmiotu:**

The aim of the subject is to provide knowledge to students in the field of application of mechatronics in industry and vehicles.

**Treści kształcenia:**

Lecture: General knowledge about mechatronic devices and systems. The lecture part consists of, among others from: 1. Initial knowledge (basic concepts): what is mechatronics and what it deals with, 2. Principles of operation, construction and application examples of sensors. 3. The principles of operation, construction and examples of use and actuators. 4. Transmission of information in the vehicle, systems for reading and transmitting information, and numerical codes as information, 5. Numerical systems, logic systems (digital gates), signal analysis, 6. Regulation and regulation systems in mechatronic systems,
Laboratory: Practical familiarization with mechatronic systems. 1. Basic elements of hydraulic systems - tests, 2. Control systems - object identification and selection of controller parameters, 3. Use of sensory and executive systems of a mobile robot in Matlab environment, 4. Robot programming in MATLAB language, 5. DSM programming, 6. Model manipulator.

**Metody oceny:**

Laboratory: Each laboratory exercise is evaluated immediately after its completion. The basis of the assessment is correct performance of the exercise (report) and passing the theoretical part after the exercise. The necessary condition for completing the laboratory is to recover all the exercises provided for in the subject curriculum in the given semester and to pass each exercise at least 3. The final laboratory grade is determined on the basis of the average number of grades obtained from individual exercises covered by the laboratory schedule. The average corresponds to the final evaluation after rounding. Lecture: Completion of the lecture part takes place during the colloquium. In addition, the knowledge gained during classes is verified during laboratory classes by completing the theoretical part, in the case of completing the lab for 4.5 or 5, the student counts the lecture at 3. The student has the opportunity to improve the grade by writing a colloquium. The prerequisite for passing the lecture is passing the colloquium to at least 3. Collective mark: The total mark from the subject is the average of the grades obtained from the laboratory and lecture part. The condition for receiving a positive grade is passing the minimum mark of both parts: laboratory and lecture.

**Egzamin:**

nie

**Literatura:**

1. A. Gajek, Z. Juda: Czujniki. Wydawnictwa Komunikacji i Łączności, Warszawa, 2008. http://WWW.ibuk.pl/korpo/fiszka.php?id=771 2. D. Schmidt (edytor): Mechatronika. REA, Warszawa,2002. 3. M. Olszewski: Podstawy Mechatroniki. REA, Warszawa, 2008. 4. C. White, M. Randall: Kody Usterek. Wydawnictwa Komunikacji i Łączności, Warszawa, 2008. 5. E. A. Zogbaum: Poradnik mechanika samochodowego .Wydawnictwa Komunikacji i Łączności, Warszawa, 2011. The materials on the site are available after logging in.

**Witryna www przedmiotu:**

LeOn course

**Uwagi:**

Materials available on the intranet after logging in. The students will receive the login and password at the first class.

## Efekty przedmiotowe

### Profil ogólnoakademicki - wiedza

**Efekt 1150-PE000-ISA-0390\_W1:**

Has knowledge (mathematics, physics) about the construction and principle of operation of mechatronic systems in electric and hybrid vehicles

Weryfikacja:

Discussion at the lecture, colloquium

**Powiązane efekty kierunkowe:** K\_W01

**Powiązane efekty obszarowe:** T1A\_W01, T1A\_W07

**Efekt 1150-PE000-ISA-0390\_W2:**

Has knowledge about the methods of diagnostics of sensors and actuators in
mechatronics of vehicles, is familiar with current diagnostic systems of electric and hybrid vehicles

Weryfikacja:

Discussion at the lecture, colloquium

**Powiązane efekty kierunkowe:** K\_W17

**Powiązane efekty obszarowe:** T1A\_W03, T1A\_W04, T1A\_W07

**Efekt 1150-PE000-ISA-0390\_W3:**

Has the basic knowledge necessary to understand non-technical conditions of engineering activities; knows the basic principles of safety and health at work in the automotive industry

Weryfikacja:

Discussion at the lecture, colloquium

**Powiązane efekty kierunkowe:** K\_W19

**Powiązane efekty obszarowe:** T1A\_W05

**Efekt 1150-PE000-ISA-0390\_W4:**

Has knowledge that allows the use of sensors in vehicle control and regulation systems

Weryfikacja:

Discussion in the laboratory, oral test before admission to perform exercises, performance of the report, passing the colloquium

**Powiązane efekty kierunkowe:** K\_W21

**Powiązane efekty obszarowe:** T1A\_W08

### Profil ogólnoakademicki - umiejętności

**Efekt 1150-PE000-ISA-0390\_U1:**

Can acquire the right knowledge in order to get information about the correct operation of mechatronic systems

Weryfikacja:

Discussion in the laboratory, oral test before admission to perform exercises, performance of the report, passing the colloquium

**Powiązane efekty kierunkowe:** K\_U08

**Powiązane efekty obszarowe:** T1A\_U08, T1A\_U09

**Efekt 1150-PE000-ISA-0390\_U2:**

Can use the acquired knowledge from the analysis of signals and numerical codes to use diagnostic software to analyze the state of components and systems in the vehicle due to the utility and economic criteria.

Weryfikacja:

Discussion in the laboratory, oral test before admission to exercise, performance of the report

**Powiązane efekty kierunkowe:** K\_U09

**Powiązane efekty obszarowe:** T1A\_U09, T1A\_U12

**Efekt 1150-PE000-ISA-0390\_U3:**

Is able to carry out diagnostics of sensors used in vehicles and determine their impact on the environmental hazard and formulate the specification of simple mechatronic systems

Weryfikacja:

Discussion in the laboratory, oral test before admission to exercise, performance of the report

**Powiązane efekty kierunkowe:** K\_U13

**Powiązane efekty obszarowe:** T1A\_U08, T1A\_U13

### Profil ogólnoakademicki - kompetencje społeczne

**Efekt 1150-PE000-ISA-0390\_K1:**

He can work individually and in a team. He can develop and present a report on his work. He is aware of the benefits of acquaintance and development of mechatronics.

Weryfikacja:

Completion of the report.

**Powiązane efekty kierunkowe:** K\_K04

**Powiązane efekty obszarowe:** T1A\_K03, T1A\_K04