## STUDY MODULE DESCRIPTION FORM

| Name of the module/subject<br>**Automatics and Robotics** | | Code<br>**1010604181010622491** |
|---|---|---|
| Field of study<br>**Mechanical Engineering** | Profile of study<br>(general academic, practical)<br>**(brak)** | Year /Semester<br>**4 / 8** |
| Elective path/specialty<br>**-** | Subject offered in:<br>**Polish** | Course (compulsory, elective)<br>**obligatory** |
| Cycle of study:<br>**First-cycle studies** | Form of study (full-time,part-time)<br>**part-time** | |

| No. of hours | | | | No. of credits |
|---|---|---|---|---|
| Lecture: **14** | Classes: **6** | Laboratory: **-** | Project/seminars: **-** | **2** |

| Status of the course in the study program (Basic, major, other)<br>**(brak)** | (university-wide, from another field)<br>**(brak)** |
|---|---|

| Education areas and fields of science and art<br><br>**technical sciences** | ECTS distribution (number and %**)**<br><br>**2   100%** |
|---|---|

### Responsible for subject / lecturer:

dr inż. Arkadiusz Barczak
email: arkadiusz.barczak@put.poznan.pl
tel. +4861 665-2011
Faculty of Working Machines and Transportation
ul. Piotrowo 3, 60-965 Poznań

### Prerequisites in terms of knowledge, skills and social competencies:

| 1 | **Knowledge** | Student should have basic knowledge in mathematical analysis, mathematical logic, Newton-Euler equation and in the domains of electronics and electrotechnics. |
|---|---|---|
| 2 | **Skills** | Student can apply his knowledge in the identification and resolving issues in the domain of automatic control and robotics. |
| 3 | **Social competencies** | Student can identify priorities during the process of problem solving. |

### Assumptions and objectives of the course:

Student must understand the utility and functions of control systems in the on-board vehicle systems and in the industrial robots.

### Study outcomes and reference to the educational results for a field of study

#### Knowledge:

1. Has the knowledge concerning the analysis and design of functional models used in the control systems and industrial robots. - [-]

2. Comprehends analysis methods used in the structure design and tuning of controllers. - [-]

3. Has knowledge in the domain of logical systems modeling. - [-]

4. Has the basic knowledge regarding control devices, their characteristics and functionality in both vehicle and industrial robots. - [-]

#### Skills:

1. Can make use of the terminology intrinsic in the domain of control system and robotics.  - [-]

2. Can co-operate in design and implementation of the control systems and industrial robots making use of the modern information and communication technologies.  - [-]

#### Social competencies:

1. Understand social and economic aspects of automatics and robotics, especially from the perspective of the sustainable development. - [-]

### Assessment methods of study outcomes

Written test

| Course description |
|---|
| Physical and mathematical models of analogue and digital control systems. The structure of the control system models. Negative and positive feedback.. System stability. Types of controllers. Choice of types, structure and parameters of PID controller. Modeling of the logical systems, both combinational and sequential. Physical models of robots and manipulators. Kinematic structure of manipulators. Kinematics and inverse kinematics. Basis of robot programming and control. Examples of robotic technologies applications. |

**Basic bibliography:**

1. Domachowski Zygfryd ?Automatyka i robotyka?, Wydaw. Politechniki Gdańskiej, 2003

2. Honczarenko Jerzy ?Roboty przemysłowe. Budowa i zastosowanie?, WNT, Warszawa 2004

3. Ogata Kutsuhiko ?Modern Control Engineering?, Prentice-Hall International, 1997

**Additional bibliography:**

1. Głocki Wojciech ?Układy cyfrowe?, Wydawnictwa Szkolne i Pedagogiczne, 2010

2. Pełczewski Władysław ?Teoria sterowania?, WNT, Warszawa, 1980

| Result of average student's workload ||
|---|---|
| **Activity** | **Time (working hours)** |
| | |

| Student's workload |||
|---|---|---|
| **Source of workload** | **hours** | **ECTS** |
| Total workload | 45 | 2 |
| Contact hours | 0 | 0 |
| Practical activities | 0 | 0 |