



## Subject card

|   |   |  |  |                                     |  |            |     |
|---|---|--|--|-------------------------------------|--|------------|-----|
| Subject name and code                       | Fundamentals of Control Systems, PG_00060646  |  |  |                                     |  |            |     |
| Field of study                              | Transport and Logistics   |  |  |                                     |  |            |     |
| Date of commencement of studies             | October 2024  | Academic year of realisation of subject                  |  |                                     | 2025/2026  |            |     |
| Education level                             | first-cycle studies   | Subject group  |  |                                     | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study         |            |     |
| Mode of study                               | Full-time studies   | Mode of delivery   |  |                                     | at the university  |            |     |
| Year of study                               | 2   | Language of instruction                                  |  |                                     | Polish   |            |     |
| Semester of study                           | 3   | ECTS credits   |  |                                     | 5.0  |            |     |
| Learning profile                            | general academic profile  | Assessment form  |  |                                     | assessment   |            |     |
| Conducting unit                             | Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology   |  |  |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  |  | dr inż. Mohammad Ghaemi  |                                     |  |            |     |
|   | Teachers  |  |  |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture  | Tutorial   | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours   | 30.0   | 15.0   | 15.0                                | 0.0  | 0.0        | 60  |
|   | E-learning hours included: 0.0  |  |  |                                     |  |            |     |
| Learning activity and number of study hours | Learning activity   | Participation in didactic classes included in study plan |  | Participation in consultation hours |  | Self-study | SUM |
|   | Number of study hours   | 60   |  | 6.0                                 |  | 59.0       | 125 |
| Subject objectives                          | The objective is to learn the fundamentals of control theory and the structures and elements of basic automation systems, as well as general information about control system design.   |  |  |                                     |  |            |     |
| Learning outcomes                           | Course outcome  |  | Subject outcome  |                                     | Method of verification   |            |     |
|   | [K6_U05] can formulate a simple engineering task and its specification in the field of design, maintenance and operation of transport means and systems   |  | The student is capable of formulating a simple engineering problem and its specification in the field of design and application of automatic control systems.                            |                                     | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools |            |     |
|   | [K6_W04] has well established knowledge in the field of computer science, electronics, automation and control, information technology and computer graphics, useful for understanding the possibilities of applying them in transport |  | The student possesses organized knowledge in the field of simple automatic control systems, which is necessary for understanding their potential applications in transportation systems. |                                     | [SW1] Assessment of factual knowledge  |            |     |

| Subject contents                     | <p>1. Introduction and basic concepts</p> <p>2. Classification of control systems</p> <p>3. Modeling of dynamic systems and description of elements of automatic control systems</p> <p>4. Types of mathematical models of dynamic systems: differential equation, transmittance, block diagram, linearization</p> <p>5. Transition function and time characteristics</p> <p>6. Feedback</p> <p>7. Analysis of time-domain and frequency-domain control systems</p> <p>8. Stability of linear control systems</p> <p>9. Controllers</p>  |   |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |
|--------------------------------------|--|---|--|--------------------------|-------------------|-------------------------------|--------------------------------------|-------|-------|------------------------------------|-------|-------|--------------|-------|-------|
| Prerequisites and co-requisites      | <p>Pre-requisite subjects:</p> <p>1. Mathematics</p> <p>2. Physics</p>   |   |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |
| Assessment methods and criteria      | <table border="1" data-bbox="453 1061 1492 1211"> <thead> <tr> <th data-bbox="453 1061 794 1093">Subject passing criteria</th> <th data-bbox="794 1061 1142 1093">Passing threshold</th> <th data-bbox="1142 1061 1492 1093">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1093 794 1149">Colloquium for credit from exercises</td> <td data-bbox="794 1093 1142 1149">51.0%</td> <td data-bbox="1142 1093 1492 1149">30.0%</td> </tr> <tr> <td data-bbox="453 1149 794 1180">Colloquium for credit from lecture</td> <td data-bbox="794 1149 1142 1180">56.0%</td> <td data-bbox="1142 1149 1492 1180">40.0%</td> </tr> <tr> <td data-bbox="453 1180 794 1211">Lab. reports</td> <td data-bbox="794 1180 1142 1211">51.0%</td> <td data-bbox="1142 1180 1492 1211">30.0%</td> </tr> </tbody> </table> |   |  | Subject passing criteria | Passing threshold | Percentage of the final grade | Colloquium for credit from exercises | 51.0% | 30.0% | Colloquium for credit from lecture | 56.0% | 40.0% | Lab. reports | 51.0% | 30.0% |
| Subject passing criteria             | Passing threshold  | Percentage of the final grade   |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |
| Colloquium for credit from exercises | 51.0%  | 30.0%   |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |
| Colloquium for credit from lecture   | 56.0%  | 40.0%   |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |
| Lab. reports                         | 51.0%  | 30.0%   |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |
| Recommended reading                  | <p>Basic literature</p> <p>Supplementary literature</p>  | <p>Nise N. S., <a href="#">Control System Engineering</a>, 8th Edition, John Wiley &amp; Sons Inc., 2019.</p> <p>- Bubnicki Z., <a href="#">Teoria i algorytmy sterowania</a>, Wydawnictwo Naukowe PWN, Warszawa, 2019.</p> <p>- Domachowski Z., <a href="#">Automatyka i robotyka podstawy</a>, Wydawnictwo PG, Gdańsk, 2003.</p> <p>- Friedland B., <a href="#">Control System Design</a>, McGraw Hill Co., 1986.</p> <p>- Kaczorek T., <a href="#">Podstawy teorii sterowania</a>, Wydawnictwo Naukowe PWN, Warszawa, 2020.</p> <p>- Ogata K., <i>Modern Control Engineering</i>, 4th edition, Prentice-Hall, 2009.</p> <p>- Perycz S., <a href="#">Podstawy automatyki</a>, skrypt dla Instytutu Okrętowego PG, Gdańsk, 1983.</p> <p>- Próchnicki W., Dzida M., <i>Zbiór zadań z podstaw automatyki</i>, skrypt dla studentów Wydziału Oceanotechniki i Okrętownictwa PG, Gdańsk, 1993.</p> <p>- Raven, F. H., <i>Automatic control engineering</i>, McGraw Hill Co., 1986.</p> |  |                          |                   |                               |                                      |       |       |                                    |       |       |              |       |       |

|  |                      |                                 |
|--|----------------------|---------------------------------|
|  | eResources addresses | Adresy na platformie eNauzanie: |
| Example issues/<br>example questions/<br>tasks being completed |                      |                                 |
| Work placement   | Not applicable       |                                 |