GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Essentials of Automatics, PG_00053183 | | |
| Field of study | Electrical Engineering | | |
| Date of commencement of studies | October 2020 | Academic year of realisation of subject | 2021/2022 |
| 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 | Part-time studies | Mode of delivery | at the university |
| Year of study | 2 | Language of instruction | Polish |
| Semester of study | 4 | ECTS credits | 4.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Arkadiusz Lewicki | |
| | Teachers | dr hab. inż. Arkadiusz Lewicki<br>dr inż. Daniel Wachowiak | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 20.0 | 10.0 | 0.0 | 0.0 | 0.0 | 30 |

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11155
Adresy na platformie eNauczanie:
PODSTAWY AUTOMATYKI [Niestacjonarne][2021/22] - Moodle ID: 21170
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=21170

**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 | 30 | 3.0 | 67.0 | 100 |

**Subject objectives**

The student learns structure and function of automatic control systems. Learns the methods of automatic control system descibing and methods of linear system analisys of automatic control. Learn how to determine the dynamic characteristics of linear systems and to determine the dynamic properties of system on the basis of its characteristic. Scores based on the ability to identify the characteristics of the dynamic properties of systems and analysis of automatic control systems. He learns the ways and transform block diagrams, is gaining the ability to study the stability

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K6_U07 | Student can design a closed control system, select regulators and analyze the stability and dynamic properties of the system | [SU1] Assessment of task fulfilment<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools |
| K6_W08 | Ability to analyze linear automation systems. Ability to determine static and dynamic characteristics. Ability to stability testing. Knowledge of structures of basic types of controllers, selection of gains and synthesis of a closed control system. Knowledge of basic automation blocks. | [SW3] Assessment of knowledge contained in written work and projects |

**Subject contents**

The control system and its components, positive and negative feedback. Laplace transformation, transfer function. Block diagrams. Response in time domain: measurement and calculation for a given transmittance. Frequency response: measurement and calculation for a given transmittance. Automation components: proportional, inertial, derivative, oscillating, delay. The characteristics of typical controllers: P, I, PI, PD, PID. Dynamic of control system. The stability of linear control systems, stability criteria. Sets of controller parameters. Examples of typical control systems.

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| Prerequisites and co-requisites | | |
| Assessment methods and criteria | | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Midterm colloquium | 60.0% | 100.0% |

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| Recommended reading | Basic literature | M. Żelazny *Podstawy automatyki*, PWN, Warszawa ,1976<br><br>M. Ferenc *Podstawy automatyki*, Skrypt pol. Śl,. nr 1003, Gliwice, 1981,<br><br>A.Urbaniak - *Podstawy automatyki,* Wyd. Politechniki Poznańskiej, Poznań, 2001,<br><br>R.H. Bishop - *Modern control systems, Dorf R.C.,* Addison-Wesley Publ. Co., 1995,<br><br>J.Kowal*,* - *Podstawy automatyki,* Wydawnictwa Naukowo-Dydaktyczne AGH, 2006,<br><br>T.Kaczorek, A. Dzieliński, W. Dąbrowski, R. Łopatka - Podstawy teorii sterowania, WNT,Warszawa, 2005 |
| | Supplementary literature | A. Markowski, J. Kostro, A. Lewandowski - *Automatyka w pytaniach i odpowiedziach,, Wydawnictwa Naukowo-Techniczne,* Warszawa, 1985<br><br>K. Rumatowski Podstawy Automatyki, Wydawnictwo Politechniki Poznańskiej, 2004<br><br>W. Greblicki Podstawy Automatyki, Oficyna Wydawnicza Politechniki Wrocławskiej, 2006<br><br>D. Horla Podstawy Automatyki, ćwiczenia labolatoryjne, Poznań 2003 |
| | eResources addresses | PODSTAWY AUTOMATYKI [Niestacjonarne][2021/22] - Moodle ID: 21170<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=21170 |
| Example issues/ example questions/ tasks being completed | Determine the stability of the system,<br><br>Determine the transmittance of the system,<br><br>Convert the block diagram of the control system,<br><br>Sketch and analyze the Bode / Nyquist characteristics. for the layout.<br><br>Select the settings of regulators for which the system will be stable<br><br>Determine the stability margin | |
| Work placement | Not applicable | |