GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Wind turbine control, PG_00065536 | | |
| Field of study | Naval Architecture and Offshore Structures | | |
| Date of commencement of studies | February 2025 | Academic year of realisation of subject | 2025/2026 |
| Education level | second-cycle studies | Subject group | Specialty subject group<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 | 1 | Language of instruction | English |
| Semester of study | 2 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Division of Automation and Marine Energy -> Institute of Naval Architecture -> 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 | 9.0 | 0.0 | 9.0 | 0.0 | 0.0 | 18 |

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 | 18 | 7.0 | 50.0 | 75 |

**Subject objectives**

Learning the basic concepts of wind turbine control systems, the method of modeling, analysis and synthesis of these systems in conjunction with operational aspects, and acquiring the ability to applycontrol systems in industrial practice in the field of offshore energy systems with an emphasis on wind farms.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_K82] is equipped to participate actively in lectures, seminars and laboratory classes conducted in foreign language | Knows specialized terminology enabling active participation in lectures and laboratory classes on wind turbine control systems. | [SK4] Assessment of communication skills, including language correctness |
| [K7_K81] is able to cooperate in international team at her/his own university, during work placement and during study abroad | Can effectively cooperate with an international team conducting projects related to the analysis, design, and implementation of wind turbine control systems. | [SK1] Assessment of group work skills |
| [K7_U04] creatively designs or modifies, either entirely or in part, a shipborne or offshore system or process according to a given specification, considering both technical and non-technical aspects, estimating costs and adopting design techniques representative for the field | Creatively designs or modifies, in whole or in part, wind turbine control systems according to given technical specifications and operational requirements, considering both technical and non-technical aspects. | [SU3] Assessment of ability to use knowledge gained from the subject |

**Subject contents**

1. Introduction, goal, nomenclature, definitions, basic concepts and types of control systems
2. Modeling a wind turbine as an object of a control system, including mechanical, aerodynamic and electrical subsystems
3. Modeling of wind influence as an input variable of the control system
4. Influenec of wind turbine operational aspects including energy conversion, mechanical load, power quality and operating modes, on the analysis and synthesis of control system
5. Wind turbine control strategies and methods, including yaw control, active pitch regulation, load control, stall control, aileron control, and generator slip control
6. Analysis and synthesis of selected control systems of wind turbines

**Prerequisites and co-requisites**

Basic information on automation and control systems at B.Sc. level in the Ocean Eng. field

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test/colloquium</td><td>50.0%</td><td>48.0%</td></tr>
<tr><td>Attendance</td><td>0.0%</td><td>4.0%</td></tr>
<tr><td>Lab. report</td><td>50.0%</td><td>48.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Lubośny Z., Farmy wiatrowe w systemie elektroenergetycznym, Wydawnictwo Naukowe PWN, Warszawa, 2016.<br>2. Bianchi F. D., De Battista H., Mantz R. J., Wind turbine control systems - principles, modelling and gain scheduling design, ISBN-10: 1-84628-492-9, Springer-Verlag London Limited, 2007.</td></tr>
<tr><td>Supplementary literature</td><td>1. Precup R. E., Kamal T., SHassan S. Z., Advanced Control and Optimization Paradigms for Wind Energy Systems, ISBN 978-981-13-5994-1, Springer Nature Singapore Pte Ltd., 2019.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Please visit the following page: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32781</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
</table>

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