GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Building Automation, PG_00047616		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Piotr Kaczmarek	
	Teachers	dr inż. Piotr Kaczmarek	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	15.0	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	4.0	36.0	100

Subject objectives

Introduction to building management systems: heating, ventilation, air conditioning and access control.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Student can use the documentation in the field of buildings systems - also in English	[SK5] Assessment of ability to solve problems that arise in practice
[K6_K01] is ready to cultivate and disseminate models of proper behaviour in and outside the work environment; make independent decisions; critically evaluate actions of their own, teams they lead and organisations they are part of; take responsibility for results of these actions; responsibly perform professional roles, including:n - observing rules of professional ethics and require it from others,n - care for the achievements and traditions of the professionn	Student can use the literature in the field of buildings systems	[SU1] Assessment of task fulfilment
[K6_K03] is ready to meet social obligations, co-organise activities for the social environment, initiate actions for the public interest, think and act in an entrepreneurial way	Student is able to design automation systems that minimize building energy consumption	[SK5] Assessment of ability to solve problems that arise in practice

<table>
<tr><td>Subject contents</td><td>1. Building as a dynamic system 2. Standards concerning building systems 3. Economical aspects of building control systems 4. Building power consumption 5. Introduction to air conditioning systems 6. Air heating process 7. Air cooling process 8. Air humidifying process 9. Air drying process 10. Heat recovery process 11. Water heaters 12. Water heater fluid flow control 13. Water heater anti-freeze protection 14. Direct exp. coolers 15. Refrigeneration unit control 16. Cross flow heat exchangers 17. Rotary heat exchangers 18. Mixing chambers 19. Heat recovery control 20. Heat recovery anti-freeze protection 21. Steam humidifiers 22. Air humidifying and drying process control 23. Air flow and pressure control 24. Sensor selection for air conditioning systems 25. Actuator selection for air conditioning systems 26. Air quality control 27. Cascade temperature control 28. Air conditioning system as MIMO plant 29. Controllers dedicated for air conditioning systems review 30. Air conditioning control systems examples 31. Przykłady realizacji systemów automatyki dla potrzeb klimatyzacji i wentylacji mechanicznej w domach jednorodzinnych 32. Central heating systems 33. Heat sources in heating systems 34. Thermal center control 35. Boiler control 36. Central and decentralized temperature control 37. Sensor and actuator control in heating systems 38. Natural power sources in heating systems 39. Controllers dedicated for heating systems review 40. Heating systems examples 41. Anti-intrusion systems 42. Sensor selection in anti-intrusion systems 43. Anti-intrusion controller functions 44. Anti-fire systems 45. Sensors for anti-fire systems 46. Building system integration advantages 47. Open communication protocols in building management systems 48. EIB and LONWORKS as examples of open protocol systems 49. EIB information media 50. EIB system topology</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>No requirements</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>55.0%</td><td>50.0%</td></tr>
<tr><td>Practical exercise</td><td>55.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>A. Szkarowski, L. Łatowski, "Ciepłownictwo", Warszawa 2008

J. I. Levenhagen, "HVAC control system design diagrams", 1999</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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