GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Integrated Sensor Networks, PG_00048585		
Field of study	Electronics and Telecommunications, Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Wójcikowski	
	Teachers	dr hab. inż. Marek Wójcikowski	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	2.0	18.0	50

Subject objectives	To become acquainted with the structure, capabilities and applications of integrated sensor networks.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	launches a microelectronic system, which is the basis for creating integrated sensor networks	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K7_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	knows the principle of low-power integrated microelectronic systems and sensor networks	[SW1] Assessment of factual knowledge
[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	launches an integrated sensor network, generates fragments of its own sensor network.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.	knows the connections between the basic functional blocks of integrated circuits for wireless communication, operation and applications of sensor networks. launches an integrated sensor network, generates fragments of its own sensor network.	[SW1] Assessment of factual knowledge

Subject contents

1. Introduction, application examples 2. Architecture of a node, hardware components 3. WSN realization techniques 4. Transceivers: parameters and structure 5. Low power radio design: MEMS, Weak Inversion CMOS 6. Sensors and actuators 7. Silicon reference clocks 8. Power supply of sensor network node 9. Energy scavenging 10. Energy consumption 11. Software and operating systems 12. Network architectures 13. Sensor network scenarions 14. Optimization goals in sensor networks 15. Design principles for WSN 16. Physical layer of communication prototocols 17. UWB for Sensor networks 18. MAC protocols 19. Link-layer protocols 20. Naming and addressing 21. Time synchronization 22. Localization and positioning 23. Topology control 24. Routing protocols 25. Data-centric networking 26. Transport layer and quality of service 27. Security in sensor networks 28. Reliability in WSN

Prerequisites and co-requisites

Knowledge of microelectronic programmable and embedded systems.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
2 midterm colloquiums	50.0%	45.0%
Practical exercise	50.0%	50.0%
Attendance to the lecture	0.0%	5.0%

Recommended reading

Basic literature	K.Willig, Protocols and Architectures for Wireless Sensor Networks, Willey & Sons 2007. I. Stojmenovic, *Handbook of Sensor Networks, Algorithms and Architectures*, Wiley & Sons, 2005.
Supplementary literature	No requirements.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable