



Subject card

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|---|--|--|---|-------------------------------------|--|------------|-----|
| 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 2023 | | Academic year of realisation of subject | | 2023/2024 | | |
| 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. | | | | | | |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [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 |
| | [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. | [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools |
| | [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_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 | [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools |
| 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 scenarios 14. Optimization goals in sensor networks 15. Design principles for WSN 16. Physical layer of communication protocols 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 |
| | Attendance to the lecture | 0.0% | 5.0% |
| | Practical exercise | 50.0% | 50.0% |
| | 2 midterm colloquiums | 50.0% | 45.0% |
| Recommended reading | Basic literature | K.Willig, Protocols and Architectures for Wireless Sensor Networks, Wiley & Sons 2007. I. Stojmenovic, <i>Handbook of Sensor Networks, Algorithms and Architectures</i> , Wiley & Sons, 2005. | |
| | Supplementary literature | No requirements. | |
| | eResources addresses | Adresy na platformie eNauczanie: Zintegrowane sieci sensorowe 2023/24 - Moodle ID: 26208 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26208 | |

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