



## Subject card

|   |  |  |  |                                     |  |            |     |
|---|--|--|--|-------------------------------------|--|------------|-----|
| Subject name and code                       | Sensors and Measurement Converters, PG_00047597  |  |  |                                     |  |            |     |
| Field of study                              | Automatic Control, Cybernetics and Robotics  |  |  |                                     |  |            |     |
| Date of commencement of studies             | October 2025   |  | Academic year of realisation of subject  |                                     | 2027/2028  |            |     |
| 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                               | Full-time studies  |  | Mode of delivery   |                                     | at the university  |            |     |
| Year of study                               | 3  |  | Language of instruction  |                                     | Polish   |            |     |
| Semester of study                           | 5  |  | ECTS credits   |                                     | 1.0  |            |     |
| Learning profile                            | general academic profile   |  | Assessment form  |                                     | assessment   |            |     |
| Conducting unit                             | Department Of Biomedical Engineering -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej   |  |  |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | dr inż. Paweł Kalinowski   |                                     |  |            |     |
|   | Teachers   |  | dr inż. Paweł Kalinowski   |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial   | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours  | 0.0  | 0.0  | 15.0                                | 0.0  | 0.0        | 15  |
|   | 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  | 15   |  | 1.0                                 |  | 9.0        | 25  |
| Subject objectives                          | Learning of students the basic issues in the metrological..  |  |  |                                     |  |            |     |
| Learning outcomes                           | Course outcome   |  | Subject outcome  |                                     | Method of verification   |            |     |
|   | [K6_U03] can design, according to required specifications, and make a simple 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 |  | The student is able, following the instructions, to assemble the measuring system and to perform measurements of the characteristics of non-electric transducers and to analyze the obtained measurement results |                                     | [SU1] Assessment of task fulfilment<br>[SU4] Assessment of ability to use methods and tools                          |            |     |
|   | [K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions  |  | Student - can choose, using the technical specifications of devices, the appropriate measurement method and appropriate electronic components, including sensors and measuring transducers for a given problem   |                                     | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information                            |            |     |

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|--|---|---|-------------------------------|
| Subject contents   | Basic concepts - measured quantity, measuring sensor and system, accuracy of measurements 2. Measuring sensors - classification, figures of merit 3. Determination of dynamic properties of transducers. 4. Resistance sensors in measurement circuits 5. Measurements of strain - strain gages 6. Basic limitations of strain gages, measurements of pressure 7. Inductance sensors and applications 8. Capacitance sensors and applications 9. Measurement circuits of impedance sensors 10. Force and pressure measurements 11. Flow measurements 12. Code transducers 13. Optoelectronic transducers - thermal detectors 14. Optoelectronic transducers - photon detectors 15. Position and motion measurements 16. Seismic measurements 17. Shock and vibration measurements 18. Piezoelectric accelerometers 19. Charge sensors 20. Charge transducers - limitations and measurement circuits 21. Temperature reference measurements 22. Thermoresistors 23. Thermocouples 24. Semiconductor temperature sensors 25. Quarz ans special purpose thermometers 26. Introduction to optical pyrometry 27. Monochromatic, radiation and multispectral pyrometers 28. Humidity sensors 29. Microsystems MEMS, MEOMS 30. Microsystems - applications |   |                               |
| Prerequisites and co-requisites                                |   |   |                               |
| Assessment methods and criteria                                | Subject passing criteria  | Passing threshold                                       | Percentage of the final grade |
|  | Self work   | 50.0%   | 80.0%                         |
|  | Entrace exam  | 50.0%   | 20.0%                         |
| Recommended reading  | Basic literature  | J. S. Wilson, Sensor Technology Handbook, Elsevir 2005. |                               |
|  | Supplementary literature  | No recomendations.                                      |                               |
|  | eResources addresses  | Adresy na platformie eNauczanie:                        |                               |
| Example issues/<br>example questions/<br>tasks being completed |   |   |                               |
| Work placement   | Not applicable  |   |                               |

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