



## Subject card

|   |   |   |                                     |            |  |   |     |
|---|---|---|-------------------------------------|------------|--|---|-----|
| Subject name and code                       | Aspects of robotics in artificial intelligence, PG_00053335   |   |                                     |            |  |   |     |
| Field of study                              | Biomedical Engineering, Biomedical Engineering, Biomedical Engineering  |   |                                     |            |  |   |     |
| Date of commencement of studies             | February 2027   | Academic year of realisation of subject   |                                     |            |  | 2026/2027   |     |
| Education level                             | second-cycle studies  | Subject group   |                                     |            |  | Optional subject group<br>Specialty subject group<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                               | 1   | Language of instruction   |                                     |            |  | Polish  |     |
| Semester of study                           | 1   | ECTS credits  |                                     |            |  | 3.0   |     |
| Learning profile                            | general academic profile  | Assessment form   |                                     |            |  | assessment  |     |
| Conducting unit                             | Department of Biomedical Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology   |   |                                     |            |  |   |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr inż. Grzegorz Jasiński   |                                     |            |  |   |     |
|   | Teachers  | dr inż. Grzegorz Jasiński<br>mgr inż. Magdalena Madej   |                                     |            |  |   |     |
| Lesson types                                | 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  | 5.0                                 |            | 40.0   | 75  |     |
| Subject objectives                          | The aim of the course is to familiarize students with issues from the border of robotics and artificial intelligence. Both hardware aspects and issues related to their practical use will be presented. Typical algorithmic and hardware solutions will be discussed. Typical solutions of robotic systems carrying out typical tasks will be shown. |   |                                     |            |  |   |     |
| Learning outcomes                           | Course outcome  | Subject outcome   |                                     |            | Method of verification   |   |     |
|   | [K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment                           | Student dobiera zależnie od aplikacji rozwiązania wykorzystywane w budowie systemów robotycznych. Student testuje działanie wybranych rozwiązań sprzętowych i algorytmicznych. Student buduje i konfiguruje wybrane systemy robotyczne realizujące typowe zadania. Student tworzy oprogramowanie sterujące pracą robotów. |                                     |            | [SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject |   |     |
|   | [K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems   | The student explains the basic differences between the various hardware solutions. The student analyzes the operation of selected algorithms used to carry out typical tasks in robotics.   |                                     |            | [SK3] Assessment of ability to organize work<br>[SK5] Assessment of ability to solve problems that arise in practice       |   |     |
|   | [K7_K03] is ready to meet social obligations, inspire and organise activities for the social environment, initiate actions for the public interest, think and act in an entrepreneurial way   | The student explains the meaning of the basic concepts related to robotics. The student indicates and explains the basic conditions for the design and use of robotic systems using artificial intelligence algorithms.   |                                     |            | [SK5] Assessment of ability to solve problems that arise in practice   |   |     |

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| Subject contents   | Course content – lecture<br>Introduction to Robotics. Sensors and sensor networks. Signal processing from sensors, artificial intelligence techniques for sensors. Video tracking of objects, classification of objects. Localization of autonomous mobile robots. Creating on-line maps with the use of autonomous mobile robots. Sensor-assisted collision avoidance systems. Map representations, navigation (position and course estimation). Electronic systems of robotic platforms. Examples of robotic platforms. Programming robots. Programming the robot's sensors. Programming motors and servos. Autonomous robots. An example of robotic solutions related to biomedical engineering. |  |                               |
| Prerequisites and co-requisites                                | There are no requirements   |  |                               |
| Assessment methods and criteria                                | Subject passing criteria  | Passing threshold  | Percentage of the final grade |
|  | laboratory  | 50.0%  | 30.0%                         |
|  | written exam  | 50.0%  | 70.0%                         |
| Recommended reading  | Basic literature  | Rishal Hurbans, Algorytmy sztucznej inteligencji. Ilustrowany przewodnik, Helion, 2021<br>Kimmo Karvinen, Tero Karvinen, Czujniki dla początkujących. Poznaj otaczający Cię świat za pomocą elektroniki, Arduino i Raspberry Pi, Helion, 2015<br>Craig J. J.: Wprowadzenie do robotyki, WNT, Warszawa, 1995<br>Bodo H., Gerth W., Popp K.: Mechatronika - komponenty, metody, przykłady, PWN, Warszawa, 2001 |                               |
|  | Supplementary literature  | HONCZARENKO J.: Roboty przemysłowe: budowa i zastosowanie. WNT, Warszawa, 2004<br><br>MORECKI A., KNAPCZYK J.(red.): Podstawy robotyki : teoria i elementy manipulatorów i robotów. wyd.3zm. i rozsz., WNT, Warszawa 1999<br><br>Buratowski T.: Teoria robotyki. AGH   |                               |
|  | eResources addresses  |  |                               |
| Example issues/<br>example questions/<br>tasks being completed |   |  |                               |
| Practical activities within the subject                        | Not applicable  |  |                               |

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