GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Satellite Technologies, E:41023W0 | | |
| Field of study | Space and Satellite Technologies | | |
| Date of commencement of studies | February 2025 | Academic year of realisation of subject | 2024/2025 |
| Education level | second-cycle studies | Subject group | |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 1 | Language of instruction | English |
| Semester of study | 1 | ECTS credits | 2.0 |
| Learning profile | | Assessment form | assessment |
| Conducting unit | Department of Geoinformatics -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Zbigniew Łubniewski | |
| | Teachers | dr hab. inż. Zbigniew Łubniewski<br>dr inż. Jerzy Demkowicz<br>dr inż. Tomasz Berezowski | |

| 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 | 0.0 | 0.0 | 30 |

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| Subject objectives | To familiarise students with the approach to artificial satellite as a system, including satellite subsystems and their roles and interdependencies, as well as to familiarise with such domains of satellite technology applications as satellite navigation and satellite remote sensing. |

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K7_W04 | Student has knowledge on satellite mission design. | [SW1] Assessment of factual knowledge |
| K7_W05 | He has the knowledge on methods and applications of satellite remote sensing. | [SW1] Assessment of factual knowledge |
| K7_W12 | He has knowledge of IT tools for processing and analyzing satellite images. | [SW1] Assessment of factual knowledge |
| K7_W13 | He has knowledge on the construction of particular segments, on the principles of operation as well as of applications of satellite navigation systems, as well as on the design of individual elements of satellite navigation systems. | [SW1] Assessment of factual knowledge |
| K7_U10 | He takes into account security aspects when solving tasks in the field of satellite technologies. | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information |
| K7_U12 | He implements tasks in the field of satellite technologies with the selection of appropriate IT tools for this purpose. | [SU1] Assessment of task fulfilment<br>[SU4] Assessment of ability to use methods and tools |
| K7_U14 | He is able to define security requirements when implementing tasks in the field of satellite technologies. | [SU1] Assessment of task fulfilment<br>[SU3] Assessment of ability to use knowledge gained from the subject |
| [K7_K02] Understands the non-technical aspects of activities in the field of space and satellite technologies, including their social consequences and impact on the state of the environment. Expresses opinions on the development of technology and related risks. | Understands non-technical aspects of activities in the field of satellite technologies. | [SK2] Assessment of progress of work<br>[SK4] Assessment of communication skills, including language correctness |
| K7_W09 | He knows marine applications of satellite navigation and satellite remote sensing. | [SW1] Assessment of factual knowledge |

**Subject contents**

Course content – lecture
Artificial Earth satellite as a system. Satellite subsystems and their roles and interdependencies: mechanical subsystem, power supply subsystem, avionics subsystem, orbit control and stabilization subsystem, thermal control subsystem, telecommunication subsystem, software and data handling subsystem, other subsystems. Satellite ground segment. Main applications of satellite technology. Satellite telecommunications. Satellite navigation: architecture, elements, functions and services of global navigation satellite system (GNSS); the essence of determining position coordinates in GNSS code measurements; pseudo range measurement, pseudo range measurement errors: tropospheric and ionospheric refractions, ephemeris data errors, clock errors, mutli-path, errors introduced by the receiver, other errors; DOP coefficients and their influence on positioning accuracy; operational characteristics of navigation positioning systems. Satellite remote sensing: Earth observation satellites (EOS) and their instrumentation components; electromagnetic waves and their use in satellite imaging; technical features of satellite EO system; sample applications of satellite remote sensing in land, sea and atmosphere observation; short review of present EO systems and programs

**Prerequisites and co-requisites**

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**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| laboratory | 50.0% | 50.0% |
| exam | 50.0% | 50.0% |

**Recommended reading**

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| Basic literature | Students will receive a reading list at the beginning of the semester. |
| Supplementary literature | - |
| eResources addresses | |

**Example issues/ example questions/ tasks being completed**

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**Practical activites within the subject**

Not applicable