GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Satellite and space navigation systems, PG_00044838 | | |
| Field of study | Geodesy and Cartography | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | 2024/2025 |
| 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 | 6 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Department of Geodesy -> Faculty of Civil and Environmental Engineering | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | prof. dr hab. inż. Mariusz Figurski | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 0.0 | 15.0 | 0.0 | 0.0 | 45 |

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23491

**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 | 45 | 6.0 | 24.0 | 75 |

**Subject objectives**

The aim of the course is to teach students issues related to space and satellite navigation systems. The main focus is on Global Navigation Satellite Systems (GNSS). The student becomes acquainted with the techniques of determining the position, elements that affect its accuracy, methods of data processing, etc. During the course, the student is introduced in detail to the algorithms used for positioning and mitigating measurement errors. In addition, other satellite techniques such as DORIS, SLR or altimetry are presented.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_U04] can use contemporary geodetic instruments, including automation of measurements, data transmission and processing in a computer-instrument system with the use of computer networks | The student is able to use modern GNSS receivers to carry out geodesy and cartography tasks, as well as to develop observations using computer applications. | [SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |
| [K6_U06] can solve geodetic tasks and select measurement methods for typical engineering tasks including the curvature of the Earth and the impact of gravity | The student knows and is able to apply measurement and estimation methods used in the GNSS technique, i.e. differential measurements, PPP, etc. | [SU5] Assessment of ability to present the results of task<br>[SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU2] Assessment of ability to analyse information<br>[SU1] Assessment of task fulfilment |
| [K6_W03] knows and understands the principles of mathematical statistics described in the examples of the adjustment computations | The student knows and understands the rules compilation of GNSS data, and rules of statistics on error analysis. | [SW3] Assessment of knowledge contained in written work and projects |

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| Subject contents | - GNSS: - Types of measurements - GNSS signals - Modeling of observations (modeling and reduction of measurement errors) - Combinations of observations - PPP method - GNSS applications- DORIS- SLR-LLR- Satellite altimetry- Satellite gravimetric measurements |
| Prerequisites and co-requisites | - knowledge of the subject "Satellite geodesy with elements of astronomy".<br>- knowledge of the adjustment computations.<br>- basic knowledge of mathematics and physics. |

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Exam | 60.0% | 70.0% |
| Lab | 60.0% | 30.0% |

**Recommended reading**

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| Basic literature | J. Sanz Subirana, J.M. Juan Zornoza and M. Hernández-Pajares: GNSS DATA PROCESSING Volume I: Fundamentals and Algorithms, ESA, 2013, ISSN: 1013-7076 |
| Supplementary literature | Shuanggen Jin, Estel Cardellach, Feiqin Xie: GNSS Remote Sensing: Theory, Methods and Applications, Springer, 2014, ISBN 978-94-007-7481-0<br><br>Bernhard Hofmann-Wellenhof, Herbert Lichtenegger, Elmar Wasle: GNSS Global Navigation Satellite Systems: GPS, GLONASS, Galileo, and more, SpringerWienNewYork, 2008, ISBN 978-3-211-73012-6 |
| eResources addresses | Adresy na platformie eNauczanie:<br>Systemy nawigacji satelitarnej i kosmicznej - Moodle ID: 43887<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43887 |

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

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