



Subject card

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|--|---|--|---|-------------------------------------|--|------------|-----|
| Subject name and code | Processing of digital signals and images, PG_00057482 | | | | | | |
| Field of study | Mechanical and Medical Engineering | | | | | | |
| Date of commencement of studies | February 2023 | Academic year of realisation of subject | | | 2022/2023 | | |
| Education level | second-cycle studies | Subject group | | | Obligatory subject group in the field of study 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 | | | 2.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Zakład Mechatroniki -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Marek Galewski | | | | |
| | Teachers | | dr hab. inż. Marek Galewski | | | | |
| 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 | | 3.0 | | 17.0 | 50 |
| Subject objectives | Teaching students essential elements of digital signal (ADC, DAC, filtration, spectral analysis) and image processing (point, context and morphological transformations) | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | [K7_U05] He/she can use measurement technique and methods to assess errors of measurement. He/she can plan and conduct research (also numerical ones) and interprets obtained results and draw conclusions | | Student records signals and perform basic analysis | | [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject | | |
| | [K7_W02] He/she has in-depth knowledge related to the medical physics and imagine diagnoses in medicine | | Student describes essential methods of image transformations and analysis | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | [K7_W01] He/she has broad knowledge referring to the high level math to solve numerical problems and tasks related to planning and to work out results of research in the scope of the field of study of mechanical-medical engineering | | Student knows sampling theorem and Fourier transform | | [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects | | |
| [K7_U12] He/she uses augmented knowledge referring to the medical physics and imagine diagnoses in the scope of the field of study of mechanical-medical engineering | | Student performs basic image transformations needed for further analysis | | [SU1] Assessment of task fulfilment | | | |

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| Subject contents | <ul style="list-style-type: none"> • Signal Processing <ul style="list-style-type: none"> • Signals classification • Analog to digital conversion • Digital to analog conversion • Basic signal parameters • Fourier transform and signal spectrum • FFT, IFFT • Frequency leakage, time windows • Sampling theorem • Image processing <ul style="list-style-type: none"> • Digital image and it's representation • Geometrical transforms • Point transforms • Context transforms • Spectral transforms • Morphological transforms • Image analysis • Artificial Intelligence in signal and image processing | | |
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Practical lab. exercises | 52.0% | 30.0% |
| | 2 written tests | 52.0% | 70.0% |
| Recommended reading | Basic literature | Lyons S.G., Understanding Digital Signal Processing, 2010 Gonzalez R., Woods R. Digital Image Processing, Person, 2018 | |
| | Supplementary literature | additional materials given during lectrue | |
| | eResources addresses | Adresy na platformie eNauczanie: | |
| Example issues/ example questions/ tasks being completed | Appropriate list of test subjects and questions will be given to the student a few weeks before the test. | | |
| Work placement | Not applicable | | |

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