



Subject card

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|---|---|--|--|------------|------------|--|-----|
| Subject name and code | Functional Modules of Electronic Systems, PG_00048100 | | | | | | |
| Field of study | Electronics and Telecommunications | | | | | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | | | | 2025/2026 | |
| Education level | first-cycle studies | Subject group | | | | Optional subject group 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 | 4 | Language of instruction | | | | Polish | |
| Semester of study | 7 | ECTS credits | | | | 3.0 | |
| Learning profile | general academic profile | Assessment form | | | | exam | |
| Conducting unit | Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Andrzej Kwiatkowski | | | | | |
| | Teachers | dr inż. Andrzej Kwiatkowski | | | | | |
| 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 | | 42.0 | 75 | |
| Subject objectives | The aim of the course is to provide to students a knowledge about design, operation and parameters of the ADC, DAC and sample S/H device. As part of the course the student also learns the principle of modular devices, types of switches used in analogue commutators and examples of amplifiers configurations applied in measuring systems. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | | Method of verification | |
| | [K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications | | Student analyzes the operation of selected constructions of DAC and ADC converters. He measures the parameters of the switches analog and organizes a modular measuring system based on USB interface. | | | [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment | |
| | [K6_W31] Knows the definitions of measurement error and uncertainty, measurement methods, including digital methods of time, frequency and phase measurements, transducer properties and knows digital signal processing systems. | | The student recognizes and knows how to define the basic parameters of S/H devices, DAC and ADC converters Knows digital methods of signal generation of any shape. Student explains the rules of convert a digital code into voltage value and voltage value to digital value. Describes processes of amplification and commutation signals in measurement devices. | | | [SW3] Assessment of knowledge contained in written work and projects | |
| Subject contents | 1. Introduction and course grading 2. Elements of measurement path of measurement systems and virtual instruments 3. Programmed sources of measurement arbitrary AC and DC signals 4. Direct methods of frequency synthesis with constant and variable number of samples over period 5. Characteristics and static / dynamic parameters of digital-to-analog converters 6. Analog-to-digital converter with increase summation of voltage and current 7. Multiplying two- and four quadrant digital-to-analog converters 8. Analog-to-digital converters classification, static and dynamic parameters 9. Multi-slope integrating A/D converters 10. Sigma-delta A/D converters 11. Multiple signal folding A/D converters 12. Parallel (flash) and serial A/D converters 13. Sample-and-hold and sample-and-track fast circuits 14. Data acquisition cards 15. Analog one or multi stage multiplexers 16. Analog switch (reed relays, CMOS, J-FET, Opto-MOS) 17. Programmable measurement amplifiers 18. Galvanic isolation circuits 19. Circuits of electronic isolation of elements from electrical network using follower | | | | | | |
| Prerequisites and co-requisites | | | | | | | |

| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
|--|--------------------------|---|-------------------------------|
| | | 50.0% | 70.0% |
| | | 50.0% | 30.0% |
| Recommended reading | Basic literature | 1. Jakubiec J., Roj.: Pomiarowe przetwarzanie próbkujące. Wyd. Politechniki Śląskiej. 2. Łakomy M., Zabrodzki J.: Scalone przetworniki a/c i c/a. PWN. 3. Noty aplikacyjne przetworników a/c i c/a Analog Devices | |
| | Supplementary literature | 1. Kulka Z., Libura A., Nadachowski M.: Przetworniki a/c i c/a, WKiŁ. 2. Winiecki W.: Organizacja komputerowych systemów pomiarowych, Oficyna Wyd. Politechniki Warszawskiej | |
| | eResources addresses | Adresy na platformie eNauczenie: | |
| Example issues/ example questions/ tasks being completed | | | |
| Work placement | Not applicable | | |

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