GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronic Systems Programming and Organization, PG_00067084		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Metrology and Electronic Systems Department -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Grzegorz Lentka	
	Teachers	dr hab. inż. Grzegorz Lentka	

Lesson types

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

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	3.0	27.0	75

Subject objectives

Getting familiar with hardware components of electronic systems, layers of electronic system integration, methods of system integration on the basis of available hardware modules and own software.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Creates user interfeces using selected programming environments. Organizes systems on the basis of available hardware modules and own software. Selects and uses technologies DDE, ActiveX, COM. Integrates systems based on TCP/IP protocol. Uses virtual instruments to develop and test software and systems.	[SU4] Assessment of ability to use methods and tools
[K6_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	Student presents layered model of electronic system and splits standalone instruments and virtualinstruments. Differentiates hardware components of electronic systems. Classifies layers of electronic system integration.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Layered model of electronic system. Standalone and virtual instruments. Hardware components of electronic systems. Multifunction data acquisition cards (DAQ). Specialized DAQ cards - synchronous sampling DAQ cards. Advanced triggering on DAQ cards. Connecting and synchronizing multiple DAQ cards. Standalone measurement and control modules. Autonomous instruments Signal conditioning systems - SCXI. Modular standards: cPCI/PXI,VXI/MXI. Layers of electronic system integration. SCPI language - standardization of device messages. VISA uniform software interface of interface systems. IVI driver technique - equivalent class of measurement instruments. Configuration and management of device driver in Measurement and Automation Explorer. Labview environment the use of graphic language to integrate hardware and software. The use of library modules, own library design. Execution time optimalization in LabView - LabView RT. Methodology of software development with LabWindowsCVI. The rules of virtual instruments development in LabWindows/CVI. System development and testing with simulated virtual instruments. Hardware modules for measurement and control programming in Lab-Windows/CVI and LabView. Development of industrial applications with Lookout and InTouch. Electronic systems user interface development using high level language environment on the example of MS Visual C++. Hardware modules programming using MS VC++. DDE protocol organisation. ActiveX and COM techniques survey in high level environments. ActiveX controls integration in electronic systems software. Communication in electronic system using TCP/IP protocol in high level environments. Distributed systems integration using TCP/IP in high level languages.
Course content – laboratory
Configuration and software for multifunctional DAQ cards. Using standalone instruments drivers for system integration. Virtual instruments as a tool for testing application software. Using the SCPI language as a mechanism for integrating multi-interface systems. Using VISA drivers as a programming interface for measurement systems. The IVI driver technique defining classes of equivalent devices. Configuration and management of drivers using Measurement and Automation Explorer. Integration of TCP/IP-based distributed systems in high-level environments.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>No requirements</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Lab exercises</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Activity/Homeworks</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>Exam</td><td>40.0%</td><td>60.0%</td></tr>
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<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. W. Nawrocki: Komputerowe systemy pomiarowe, WKiŁ 2006 2. W. Winiecki: Organizacja komputerowych systemów pomiarowych, Oficyna Wydawnicza PW 1997</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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