GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Internet and distributed systems, PG_00053373		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Mariusz Kaczmarek	
	Teachers	dr hab. inż. Mariusz Kaczmarek	

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	2.0	18.0	50

Subject objectives	The aim of the course is to familiarize students with Internet technologies and methods of distributed processing in the cloud of data from health support and health monitoring systems. One-dimensional and two-dimensional data (images) and image sequences are taken into account. The principles of designing and programming distributed services in selected architectures are discussed.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U06] can analyse the operation of components, circuits and systems related to the field of study; measure their parameters; examine technical specifications; interpret obtained results and draw conclusions	Is able to analyze the algorithm diagram and is able to interpret/ modify the application source code	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K7_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	Is able to design and implement an algorithm for establishing connections and exchanging requests in the client-server (agent-manager) model in a selected programming language.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U03] can design, according to required specifications, and make a complex 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	Is able to implement an IT project based on defined functional and non-functional requirements.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student understands the principles of operation of content exchange systems between client devices and remote servers.	[SW1] Assessment of factual knowledge

Subject contents

Internet distributed systems - definitions, basic concepts, base services in distributed systems
Features of distributed systems. Requirements for distributed systems (including communication, synchronization and data exchange in distributed systems, data consistency models in SR)
Architectures of distributed processing systems (client-server, multi-node systems).
Data reconstruction in distributed systems and distributed transactions
Modern programming languages for implementing Internet and distributed systems (e.g. Python, libraries, JavaScript, etc.)
Distributed processing in web systems (including multi-threaded and parallel processing, e.g. Python multiprocessing, multithreading)
Distributed processing in web systems (including REST, remote implementation of machine learning tasks, e.g. JavaScript vs. Python/TensorFlow)
Development of computationally intensive applications in distributed environments (e.g. HPC clusters; MPI standard, Apache Spark, etc.)

Lab
Practical use of distributed processing system architectures (client-server, multi-node systems, TCP vs. UDP, etc.)
Practical implementation of distributed processing in web systems using multi-threaded, parallel processing.
Practical implementation of distributed processing in web systems using remote method calling technology (e.g. REST)
Practical implementation of distributed processing in the implementation of machine learning tasks (e.g. Python, TensorFlow, JavaScript)
Practical implementation of an Internet system in the field of medical services

Prerequisites and co-requisites

Programming skills in any language, e.g. C++, Python.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test	51.0%	20.0%
Own work - study	51.0%	20.0%
Practice work	51.0%	60.0%

Recommended reading

Basic literature

1. Distributed Systems: Principles and Paradigms 2nd Edition, Andrew S. Tanenbaum, Maarten van Steen, ISBN: 978-1530281756
2. INTERNET COMPUTING: PRINCIPLES OF DISTRIBUTED SYSTEMS AND EMERGING INTERNET-BASED TECHNOLOGIES, Ali Sunyaev, Springer, 2020, ISBN: 9783030349561

	Supplementary literature	1. M. Ben-Ari, "Podstawy programowania współbieżnego i rozproszonego", WNT 2009. 2. Dokumentacja języka Python (www.python.org). 3. Dokumentacja frameworka Django (http://www.djangoproject.com). 4. Dokumentacja biblioteki Wt (http://www.webtoolkit.eu/wt)
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	