



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 2022	Academic year of realisation of subject				2022/2023	
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		mgr inż. Natalia Kowalczyk dr hab. inż. Mariusz Kaczmarek				
Lesson type and method 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 data processing in the cloud from health support systems and health monitoring. One-dimensional, two-dimensional (images) data and image sequences are taken into account.						

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	He can analyze the algorithm diagram and is able to interpret / modify the source code of the application.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	[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 on the basis of defined functional and non-functional requirements.	[SU3] Assessment of ability to use knowledge gained from the subject [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
	[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	Can design and implement an algorithm in a selected programming language.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	<p>Internet distributed systems - definitions, basic concepts, basic services in distributed systems</p> <p>Features of distributed systems. Requirements for distributed systems (e.g. communication, synchronization and data exchange in distributed systems, data consistency models in SR)</p> <p>Architecture of distributed processing systems (client-server, multi-node systems).</p> <p>Data reconstruction in distributed systems and distributed transactions</p> <p>Modern programming languages in the implementation of Internet and distributed systems (e.g. Python, libraries, JavaScript, etc.)</p> <p>Distributed computing in web systems (including multithreaded, parallel processing, e.g. Python multiprocessing, multithreading)</p> <p>Distributed computing in web systems (including REST, remote implementation of machine learning tasks, e.g. JavaScript vs. Python / TensorFlow)</p> <p>Development of intensive computing applications in distributed environments (e.g. HPC clusters; MPI standard, Apache Spark, etc.)</p> <p>Lab</p> <p>Practical use of distributed computing systems architectures (client-server, multi-node systems, TCP vs. UDP, etc.)</p> <p>Practical implementation of distributed processing in WWW systems with the use of multithreaded parallel processing.</p> <p>Practical implementation of distributed processing in WWW systems with the use of remote method calling technology (e.g. REST)</p> <p>Practical implementation of distributed processing in the implementation of machine learning tasks (e.g. Python, TensorFlow, JavaScript)</p> <p>Practical implementation of an internet system in the field of medical services</p>											
Prerequisites and co-requisites	Knowledge of the basics of programming in any scripting and object-oriented language.											
Assessment methods and criteria	<table border="1" data-bbox="451 1167 1487 1267"> <thead> <tr> <th data-bbox="451 1167 794 1200">Subject passing criteria</th> <th data-bbox="794 1167 1137 1200">Passing threshold</th> <th data-bbox="1137 1167 1487 1200">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 1200 794 1234">Test</td> <td data-bbox="794 1200 1137 1234">51.0%</td> <td data-bbox="1137 1200 1487 1234">40.0%</td> </tr> <tr> <td data-bbox="451 1234 794 1267">Laboratory</td> <td data-bbox="794 1234 1137 1267">51.0%</td> <td data-bbox="1137 1234 1487 1267">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Test	51.0%	40.0%	Laboratory	51.0%	60.0%
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Test	51.0%	40.0%										
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<ol data-bbox="794 1274 1487 1632" style="list-style-type: none"> <li data-bbox="794 1274 1487 1352">1. Distributed Systems: Principles and Paradigms 2nd Edition, Andrew S. Tanenbaum, Maarten van Steen, ISBN: 978-1530281756 <li data-bbox="794 1352 1487 1453">2. INTERNET COMPUTING: PRINCIPLES OF DISTRIBUTED SYSTEMS AND EMERGING INTERNET-BASED TECHNOLOGIES, Ali Sunyaev, Springer, 2020, ISBN: 9783030349561 <li data-bbox="794 1453 1487 1487">1. M. Ben-Ari, "Podstawy programowania współbieżnego i rozproszonego", WNT 2009. <li data-bbox="794 1487 1487 1520">2. Tech documentation Python (www.python.org). <li data-bbox="794 1520 1487 1576">3. Tech documentation framework Django (http://www.djangoproject.com). <li data-bbox="794 1576 1487 1632">4. Tech documentation - library Wt (http://www.webtoolkit.eu/wt) 										
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											