GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Concurrent and distributed processing, PG_00061802		
Field of study	Data Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	5.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Computer Architecture -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mariusz Matuszek	
	Teachers	dr inż. Tadeusz Matuszek	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	15.0	0.0	60

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	60	10.0	55.0	125

Subject objectives

Teaching foundations and rules of distributed and parallel processing in networked computer systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W06] classifies the acquired information, assessing its usefulness in solving the formulated problems	Student understand the major concurrency patterns and can describe them	[SW1] Assessment of factual knowledge
[K6_W01] identifies conditioning of the processes occurring in the analyzed systems and selects methods for solving them, using the accumulated knowledge and taking into account the mutual relations between the analyzed phenomena	Student understands how the race condition occurs and can apply correct protection measures against occurence of race conditions	[SW3] Assessment of knowledge contained in written work and projects
[K6_U04] formulates logical solutions to complex or unstructured problems	Student prepares a non-trivial distributed application focused on concurrent data processing and global state protection and synchronisation	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents

1. Introduction to the course. Completion rules
2. Abstraction of concurrent processing
3. Parallel processing in examples
4. Critical section - introduction
5. Classical problems of concurrent processing: producers - consumers, readers writers, five philosophers
6. Semaphores detailed classification with descriptions
7. Concurrent and multi-entry procedures
8. Solutions for classic topics of concurrent processing with use of semaphores
9. Binary and general semaphores in Unix system
10. Multi- thread programming
11. Access and execution synchronization for threads or processes
12. Libraries of concurrent functions for Unix systems
13. Monitor introduction and description of the mechanism
14. Monitors in solving of concurrent processing problems practical examples
15. Conditional variables in Unix systems, practical implementation of monitor procedures
16. Comparison of semaphores and monitor mechanisms - theoretical approach

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Knowledge of programming in C is helpful.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Practical laboratories</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Term-long design</td><td>50.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Ben-Ari M.: Podstawy programowania współbieżnego, Wydawnictwa Naukowo Techniczne, Warszawa.
2. Colouris G., Dollimore J., Kindberg G.: Distributed Systems,Concepts and Design, second edition, Addison-Wesley.
3. Coulouris G., Dollimore J, Kindberg T.: Systemy rozproszone Podstawy i projektowanie, Wydawnictwa Naukowo Techniczne, Warszawa.
4. Hwang K., Briggs F.: Computer Architecture and Parallel Processing, McGraw - Hill.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Lister A., Eager R.: Introduction to Operating Systems, Wydawnictwa Naukowo Techniczne, Warszwa.
2. Silberschatz A., Gavlin P.: Operating Systems Basics, Wydawnictwa Naukowo Techniczne, Warszwa.
3. Stevens R.: Unix Network Programming, Prentice Hall.</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3"></td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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