GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Critical Systems Software Testing, PG_00065872		
Field of study	Space and Satellite Technologies		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Specialty 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Intelligent Interactive Systems -> Faculty of Electronics Telecommunications and Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Bogdan Wiszniewski	
	Teachers	prof. dr hab. inż. Bogdan Wiszniewski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	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	8.0	22.0	75

Subject objectives

Present software development standards in force in the European space industry as well as methods and techniques for their implementation.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K03] Can analyse and implement assigned tasks while maintaining high technical standards. Is able to work and interact in a group, taking on different roles. Adheres to the principles of professional ethics and respects the diversity of views and cultures.	Student can implement assigned tasks from the area covered by this course taking into account technical aspects as well as economic, cultural, ethical and legal conditions.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U07] Identifies and describes technical problems and is able to solve them choosing the relevant methods and tools. Is able to select and use the appropriate, also the advanced, IT solution for the specific problem in the field of space and satellite technologies.	The student is able to select appropriate techniques and tools in the development and testing of critical systems software.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K7_W04] Knows and understands, to an increased extent, processes occurring in the life cycle of equipment, objects and technical systems, including software systems.	The student knows the processes related to the development of high-quality IT systems	[SW1] Assessment of factual knowledge

Subject contents

1. A systematic approach in the development of high quality IT systems.
2. ECSS standard series: "Space engineering Software" oraz "Space product assurance - Software product assurance"
3. Life-cycle vs. testing cycle of software product.
4. Software validation, verification and testing (VVT) processes.
5. Planning of VVT processes.
6. Static analysis of software products.
7. Error, program and execution environment models.
8. Functional (black-box) testing strategies.
9. Structural (white-box) testing strategies

<table>
<tr><td>Prerequisites and co-requisites</td><td></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>Definition, performance and reporting of test results for a selected field of functionality (lab assignment)</td><td>50.0%</td><td>30.0%</td></tr>
<tr><td>Documentation of the testing process according to the ECSS standard (projet assignment)</td><td>50.0%</td><td>30.0%</td></tr>
<tr><td>Final test</td><td>50.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Space engineering – Software, ECSS‑E‑ST‑40C, 6 March 2009, European Cooperation for Space Standardization, ESA-ESTEC, http://ecss.nl/standards/ecss-standards-on-line/active-standards
2. Space product assurance - Software product assurance, ECSS-Q-ST-80C Rev.1, 15 February 2017, European Cooperation for Space Standardization, ESA-ESTEC, http://ecss.nl/standards/ecss-standards-on-line/active-standards</td></tr>
<tr><td>Supplementary literature</td><td>1. Krawczyk., H., Wiszniewski, B.: Analysis and Testing of Distributed Software Applications, Research Studies Press, Wiley, Baldock, England, 1998
2. IEEE Software and Systems Engineering Standards, http://standards.ieee.org/findstds/standard/software_and_systems_engineering.html.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Life-cycle processes defined by the ECSS standard.
2. Quality attributes of critical systems;
3. FMECA/FMEA methods for analyzing critical system components;
4. Software testing strategies.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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