

Subject card

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February 2024		Academic year of realisation of subject			2024/2025		
second-cycle studies		Subject group			Optional subject group		
Full-time studies		Mode of delivery			at the university		
1		Language of instruction			Polish		
2		ECTS credits			3.0		
general academic profile		Assessment form			assessment		
Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecommunications and Inform						nd Informatics	
Subject supervisor		prof. dr hab. inż. Bogdan Wiszniewski					
Teachers		prof. dr hab. inż. Bogdan Wiszniewski					
		dr inż. Adam Kaczmarek					
Lesson type	Lecture	Tutorial	Laboratory Project		t	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0		0.0	45
E-learning hours inclu	uded: 0.0		•				
Learning activity	classes includ		Participation in consultation hours		Self-study		SUM
Number of study hours	45		0.0		0.0		45
Present software development standards in force in the European space industry as well as methods and techniques for their implementation.							
Course outcome		Subject outcome			Method of verification		
K7_U08		Student is able to select and apply the IT product quality assurance techniques adequate to the quality characteristics assumed for this product.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
[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_W12		Student has the knowledge on development of on-board software and terrestrial space systems, and on the software life cycle as defined in ECSS standards.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
 A systematic approach in the development of high quality IT systems. ECSS standard series: "Space engineering – Software" oraz "Space product assurance - Software product assurance" Life-cycle vs. testing cycle of software product. Software validation, verification and testing (VVT) processes. Planning of VVT processes. Static analysis of software products. Error, program and execution environment models. Functional (black-box) testing strategies. Structural (white-box) testing strategies 							
	Space and Satellite T February 2024 second-cycle studies Full-time studies 1 2 general academic pro Department of Intellig Subject supervisor Teachers Lesson type Number of study hours E-learning hours inclut Learning activity Number of study hours Present software dev techniques for their in Course out K7_U08 [K7_K03] Can analys implement assigned maintaining high tech standards. Is able to interact in a group, to different roles. Adhe principles of professi and respects the diviand cultures. K7_W12 1. A systematic app 2. ECSS standard in product assurant 3. Life-cycle vs. tes 4. Software validati 5. Planning of VVT 6. Static analysis of 7. Error, program a 8. Functional (black	Space and Satellite Technologies February 2024 second-cycle studies Full-time studies 1 2 general academic profile Department of Intelligent Interactive Subject supervisor Teachers Lesson type Lecture Number of study hours E-learning hours included: 0.0 Learning activity Participation in classes including plan Number of study hours Present software development stand techniques for their implementation. Course outcome K7_U08 [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. K7_W12 1. A systematic approach in the definition of the principle of professional ethics and respects the diversity of views and cultures. K7_W12 1. A systematic approach in the definition of the principle of professional ethics and respects the diversity of views and cultures. K7_W12 1. A systematic approach in the definition of the principle of professional ethics and respects the diversity of views and cultures. K7_W12 1. A systematic approach in the definition of the principle of professional ethics and respects the diversity of views and cultures. K7_W12 1. A systematic approach in the definition of the principle of professional ethics and respects the diversity of views and cultures. K7_W12 1. A systematic approach in the definition of the principle of professional ethics and respects the diversity of views and cultures. K7_W12	February 2024 Realisation Second-cycle studies Full-time studies Mode of de Language of ECTS cred general academic profile Department of Intelligent Interactive Systems -> Fa Subject supervisor Teachers Department of Intelligent Interactive Systems -> Fa Subject supervisor Teachers Department of Intelligent Interactive Systems -> Fa Subject supervisor Teachers Department of Intelligent Interactive Systems -> Fa Subject supervisor Teachers Department of Intelligent Interactive Systems -> Fa Subject supervisor Teachers Department of Intelligent Interactive Systems -> Fa Subject supervisor Teachers Department of Intelligent Interactive Systems -> Fa Subject supervisor Prof. dr hab. in dr in2. Adam Lesson type Lecture Tutorial Number of study hours Participation in didactic classes included in study plan Number of study hours Present software development standards in force in techniques for their implementation. Course outcome Subject systems -> Fa Subject system	Space and Satellite Technologies February 2024 Academic year of realisation of subject second-cycle studies Subject group Full-time studies Mode of delivery Language of instruction ECTS credits general academic profile Assessment form Department of Intelligent Interactive Systems -> Faculty of Electror Subject supervisor Teachers prof. dr hab. inż. Bogdan Windrinż. Adam Kaczmarek Lesson type Lecture Lesson type Lecture Tutorial Laboratory Number of study hours E-learning hours included: 0.0 Learning activity Participation in didactic classes included in study plan Number of study hours Present software development standards in force in the Europear techniques for their implementation. Course outcome K7_U08 Student is able to select and the IT product quality assurate techniques adequate to the characteristics assumed for product. [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. K7_W12 Student can 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. K7_W12 Student can 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. K7_W12 Student tas the knowledge development of on-board so and terrestrial space system on the software life cycle a defined in ECSS standards. 1. A systematic approach in the development of high quality IT of the principle of	February 2024 February 2024 Academic year of realisation of subject Second-cycle studies Full-time studies Mode of delivery Language of instruction ECTS credits general academic profile Assessment form Department of Intelligent Interactive Systems -> Faculty of Electronics, To Subject supervisor Teachers prof. dr hab. inż. Bogdan Wiszniews dr inż. Adam Kaczmarek Lesson type Lecture Tutorial Laboratory Project Number of study hours E-learning hours included: 0.0 Learning activity Participation in didactic classes included in study plan Number of study hours Present software development standards in force in the European space techniques for their implementation. Course outcome K7_U08 Student is able to select and apply the IT product quality assurance techniques adequate to the quality characteristics assurance techniques adequate to the quality characteristics and respects the diversity of views and cultures. K7_W12 Student can 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. Student has the knowledge on development of on-board software and terrestrial space systems, and on the software life cycle as defined in ECSS standards. 1. A systematic approach in the development of high quality IT systems conditions of the processes. Static analysis of software product. Software validation, verification and testing (VVT) processes. Static analysis of software products. Ferror, program and execution environment models. Functional (black-box) testing strategies. Functional (black-box) testing strategies.	Space and Satellite Technologies February 2024 Academic year of realisation of subject second-cycle studies Subject group Option Full-time studies Mode of delivery 1 Language of instruction 2 ECTS credits 3.0 general academic profile Assessment form Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Subject supervisor Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Subject supervisor Teachers Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Subject supervisor Teachers Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Subject supervisor Teachers Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Subject supervisor Teachers Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Teachers Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Teachers Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecomr Subject supervisor Prof. dr hab. in2. Bogdan Wiszniewski dr inž. Adam Kaczmarek Lesson type Lecture Tutorial Laboratory Project Number of study Number of study Nours Present software development standards in force in the European space industry techniques adequate to the quality characteristics assumed for this Subject outcome K7_U08 Student is able to select and apply the IT product quality assurance techniques adequate to the quality characteristics assumed for this product. Student can implement assigned tasks from the area covered by management assigned tasks while management assigned tasks while management assigned tasks while management assigned tasks from the area covered by management assigned tasks from	Space and Satellite Technologies Academic year of realisation of subject Subject group Optional subject group It is university I

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Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Final test	50.0%	40.0%			
	Definition, performance and reporting of test results for a selected field of functionality (lab assignment)	50.0%	30.0%			
	Documentation of the testing process according to the ECSS standard (projet assignment)	50.0%	30.0%			
Recommended reading	Basic literature	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 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				
	Supplementary literature	Krawczyk., H., Wiszniewski, B.: Analysis and Testing of Distributed Software Applications, Research Studies Press, Wiley, Baldock, England, 1998 IEEE Software and Systems Engineering Standards, http://standards.ieee.org/findstds/standard/software and systems engineering.html.				
	eResources addresses	Adresy na platformie eNauczanie:				
		Testowanie oprogramowania systemów krytycznych - zima'24 - Moodle ID: 19149 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19149				
Example issues/ example questions/ tasks being completed	 Life-cycle processes defined by the ECSS standard. Quality attributes of critical systems; FMECA/FMEA methods for analyzing critical system components; Software testing strategies. 					
Work placement	Not applicable					

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