



Subject card

Subject name and code	Applied software - team project, PG_00064063								
Field of study	Technical Physics								
Date of commencement of studies	October 2024	Academic year of realisation of subject		2027/2028					
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	4		Language of instruction		Polish				
Semester of study	7		ECTS credits		4.0				
Learning profile	general academic profile		Assessment form		assessment				
Conducting unit	Division of Theoretical Physics and Quantum Information -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology								
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marta Łabuda						
	Teachers								
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM		
	Number of study hours	15.0	0.0	0.0	45.0	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		5.0		35.0	100		
Subject objectives	The objective of the course is to familiarize students with the role of application software in information systems and to develop their skills in creating and managing it. The course covers topics related to IT project management, including resource planning, scheduling, and budgeting, as well as software configuration management and version control. Students will learn methods for software implementation and integration in IT systems and gain knowledge of testing processes, including unit, integration, and system tests. The course also emphasizes test automation, the application of TDD and BDD, and ensuring software quality at different stages of its lifecycle. The aim is to prepare students for effective design, implementation, and management of the application software lifecycle in various technological environments.								

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U09] uses technical literature in English	The student is familiar with the basic specialized literature in English in the field of software engineering and can identify the most important sources of information in this area. The student is able to independently search for and select specialized literature in English, use it in research work, and assess its reliability and relevance.	[SU4] Assessment of ability to use methods and tools
	[K6_W05] has knowledge of programming methodology and techniques, and the use of selected IT tools in physics and technology	The student is familiar with software development methodologies (e.g., waterfall, iterative, agile) and basic programming techniques. The student knows selected IT tools that support the software development process (programming environments, version control systems, modeling tools such as CASE for UML diagrams, and testing tools), can use them effectively, and understands their application in solving problems in physics and engineering.	[SW1] Assessment of factual knowledge
	[K6_K04] cooperate and work in a group, performing different functions	The student is familiar with the basic team roles in IT projects (e.g., analyst, designer, programmer, tester, team leader, Scrum Master, Product Owner) and understands the principles of effective team collaboration. The student is able to work efficiently in a project team, responsibly performing the assigned role, adhering to established collaboration rules, and adapting to the evolving needs of the team. The student can communicate within the team, delegate tasks, report progress, and actively participate in team decision making.	[SK1] Assessment of group work skills
	[K6_U03] knows programming languages and can use basic software packages	The student is able to create, compile, and run programs in a chosen programming language using basic language constructs (control statements, data structures, functions/methods). The student can also utilize selected software packages and development tools (e.g., IDE, version control system, repository, standard libraries, frontend frameworks, computational programs) in the software development process.	[SU1] Assessment of task fulfilment

<b>Subject contents</b>	<p>Course content – lecture</p> <ol style="list-style-type: none"> <li>1. Definition, classification, and role of application software in information systems. Applications in science and technology.</li> <li>2. IT project management: resources, personnel, schedule, and budget.</li> <li>3. Software configuration management. Overview of popular applications and platforms. Tool environments as well as technologies and frameworks. Use of CASE tools.</li> <li>4. Software implementation and integration.</li> <li>5. Coding, version control, and code security.</li> <li>6. Software testing and validation. Types of tests: unit, integration, and system tests; validation and acceptance testing.</li> <li>7. Typical testing phases and methods. Static, functional, and structural testing. Success factors and outcomes of testing. Test documentation. Software reviews.</li> <li>8. Test process automation. Debugging tools. Test-driven and behavior-driven development (TDD and BDD).</li> <li>9. Software quality. Software quality assurance. Quality management. Costs of quality assurance. Best practices.</li> <li>10. Software installation and deployment. Software maintenance. Analysis of the need for modifications. Change management. Software maintenance costs. Key success factors of the maintenance phase.</li> </ol>												
	<p>Course content – project</p> <p>Application development based on the adopted methodology, patterns (analytical, design), frameworks, and components, along with project documentation. Work with a repository and project management software:</p> <ol style="list-style-type: none"> <li>1. Introduction. Assumptions of the project work, its execution, and documentation. Discussion of project topics and project teams. Project description and design assumptions. Presentation of sample design solutions.</li> <li>2. Presentation of ideas (project pitch). Problem identification. Context and stakeholders of the problem; project client. Enhanced profile, system definition and vision, system scope.</li> <li>3. Project feasibility study: objective, product, scope of the undertaking; risk identification, selection of the project implementation strategy. Project work schedule.</li> <li>4. Selection of a project management strategy. Further implementation steps depending on the adopted methodology (waterfall, agile).</li> <li>5. Implementation work: system architecture design, logical and static models, applied algorithms, GUI design, database design.</li> <li>6. Implementation work: software development.</li> <li>7. Implementation work: code inspection (code review). Inspection report.</li> <li>8. Implementation work: software integration.</li> <li>9. Testing and validation of the developed software; test report.</li> <li>10. Finalization of project, implementation, and documentation work. Preparation of the Final Report. Technical acceptance of the project. Presentation, discussion of results, and project summary.</li> </ol> <p>Each week of work concludes with a Project Progress Report.</p>												
<b>Prerequisites and co-requisites</b>	Ability to make an object-oriented programming; Knowledge of software engineering												
<b>Assessment methods and criteria</b>	<table border="1"> <thead> <tr> <th data-bbox="446 1821 794 1859">Subject passing criteria</th><th data-bbox="794 1821 1156 1859">Passing threshold</th><th data-bbox="1156 1821 1487 1859">Percentage of the final grade</th></tr> </thead> <tbody> <tr> <td data-bbox="446 1859 794 1897">Presentation</td><td data-bbox="794 1859 1156 1897">50.0%</td><td data-bbox="1156 1859 1487 1897">10.0%</td></tr> <tr> <td data-bbox="446 1897 794 1936">Reports</td><td data-bbox="794 1897 1156 1936">50.0%</td><td data-bbox="1156 1897 1487 1936">10.0%</td></tr> <tr> <td data-bbox="446 1936 794 1974">Project</td><td data-bbox="794 1936 1156 1974">50.0%</td><td data-bbox="1156 1936 1487 1974">80.0%</td></tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	Presentation	50.0%	10.0%	Reports	50.0%	10.0%	Project	50.0%	80.0%
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<b>Recommended reading</b>	<b>Basic literature</b>	<ol style="list-style-type: none"> <li>1. Robert C. Martin, <i>Czysty kod</i>, Helion, 2020 (druk/aktualne wydanie).</li> <li>2. Marcin Kawalec, <i>Scrum i nie tylko. Zwinne metody w praktyce</i>, Helion, 2019.</li> <li>3. Paweł Jakubczyk, <i>Testowanie oprogramowania. Podstawy</i>, Helion, 2019.</li> <li>4. Robert. Patton: <i>Testowanie oprogramowania</i>, Mikom, Warszawa, 2002.</li> <li>5. Mario Tsitoara --Git i GitHub. Kontrola wersji, zarządzanie projektami i zasady pracy zespołowej (oryg: Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer)</li> <li>6. Michał Bartyzel <i>DevOps. Inżynieria niezawodności systemów IT</i> Helion, 2020</li> </ol>
	<b>Supplementary literature</b>	<ol style="list-style-type: none"> <li>1. Andrzej Jaszkiewicz, <i>Zarządzanie projektami informatycznymi</i>, PWN, 2019.</li> <li>2. Leszek Bukowski, <i>Analiza i projektowanie systemów informatycznych</i>, PWN, 2018.</li> <li>3. Adam Roman, Michał Sadowski, <i>Testowanie i jakość oprogramowania</i>, PWN, 2021.</li> <li>4. List of the accessible homepages of the selected by students IT technologies in which the group project is prepared.</li> </ol>
	<b>eResources addresses</b>	

<b>Example issues/ example questions/ tasks being completed</b>	<p>Topics:</p> <ol style="list-style-type: none"> <li>1. The role and importance of application software in modern information systems.</li> <li>2. Planning and management of an IT project, including resources, scheduling, and budgeting.</li> <li>3. Software configuration and version control management using modern tools and platforms.</li> <li>4. The process of software implementation and integration in complex information systems.</li> <li>5. Methods and techniques of software testing and their impact on the quality of the final product.</li> <li>6. Test automation and the application of TDD and BDD approaches in the software development process.</li> <li>7. Software quality assurance and maintenance best practices, costs, and change management.</li> </ol> <p>Tasks:</p> <ul style="list-style-type: none"> <li>Project schedule</li> <li>Reports of the work development</li> <li>Implementation of the project</li> <li>Code review</li> <li>Testing</li> <li>Project presentation</li> </ul>
<b>Practical activites within the subject</b>	Not applicable

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