



## Subject card

|   |  |  |          |                                     |  |            |     |
|---|--|--|----------|-------------------------------------|--|------------|-----|
| Subject name and code                       | Applied software - team project, PG_00064063   |  |          |                                     |  |            |     |
| Field of study                              | Technical Physics  |  |          |                                     |  |            |     |
| Date of commencement of studies             | October 2026   | Academic year of realisation of subject                  |          |                                     | 2029/2030  |            |     |
| Education level                             | first-cycle studies  | Subject group  |          |                                     | Optional subject group<br>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 Informaton -> 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_U03] possesses programming skills in a selected language and the ability to use selected 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  |
|                   | [K6_K03] demonstrates readiness to perform professional roles responsibly, adhere to ethical principles and ensure occupational safety. | The student is prepared to perform professional duties responsibly, in accordance with ethical principles and workplace safety regulations.   | [SK5] Assessment of ability to solve problems that arise in practice                                       |
|                   | [K6_W05] has knowledge of programming methodologies and techniques, as well as the use of selected IT tools in physics and engineering. | 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_U07] is able to solve problems within a team, including interdisciplinary teams, appropriately planning its work.                   | The student is able to collaborate effectively in a team, including interdisciplinary teams. The student is able to plan and organize team work to solve complex problems. The student is able to communicate and coordinate tasks within a project team.   | [SU2] Assessment of ability to analyse information<br>[SU4] Assessment of ability to use methods and tools |

| Subject contents                | <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> <hr/> <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> |                               |                   |                               |         |       |       |         |       |       |              |       |       |
|---------------------------------|--|-------------------------------|-------------------|-------------------------------|---------|-------|-------|---------|-------|-------|--------------|-------|-------|
| Prerequisites and co-requisites | Ability to make an object-oriented programming; Knowledge of software engineering  |                               |                   |                               |         |       |       |         |       |       |              |       |       |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th data-bbox="453 1830 794 1861">Subject passing criteria</th> <th data-bbox="794 1830 1139 1861">Passing threshold</th> <th data-bbox="1139 1830 1485 1861">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1868 794 1899">Project</td> <td data-bbox="794 1868 1139 1899">50.0%</td> <td data-bbox="1139 1868 1485 1899">80.0%</td> </tr> <tr> <td data-bbox="453 1906 794 1937">Reports</td> <td data-bbox="794 1906 1139 1937">50.0%</td> <td data-bbox="1139 1906 1485 1937">10.0%</td> </tr> <tr> <td data-bbox="453 1944 794 1975">Presentation</td> <td data-bbox="794 1944 1139 1975">50.0%</td> <td data-bbox="1139 1944 1485 1975">10.0%</td> </tr> </tbody> </table>  | Subject passing criteria      | Passing threshold | Percentage of the final grade | Project | 50.0% | 80.0% | Reports | 50.0% | 10.0% | Presentation | 50.0% | 10.0% |
| Subject passing criteria        | Passing threshold  | Percentage of the final grade |                   |                               |         |       |       |         |       |       |              |       |       |
| Project                         | 50.0%  | 80.0%                         |                   |                               |         |       |       |         |       |       |              |       |       |
| Reports                         | 50.0%  | 10.0%                         |                   |                               |         |       |       |         |       |       |              |       |       |
| Presentation                    | 50.0%  | 10.0%                         |                   |                               |         |       |       |         |       |       |              |       |       |

|                     |                          |   |
|---------------------|--------------------------|---|
| Recommended reading | Basic literature         | <p>1. Robert C. Martin, <i>Czysty kod</i>, Helion, 2020 (dodruk/aktualne wydanie).</p> <p>2. Marcin Kawalec, <i>Scrum i nie tylko. Zwinne metody w praktyce</i>, Helion, 2019.</p> <p>3. Paweł Jakubczyk, <i>Testowanie oprogramowania. Podstawy</i>, Helion, 2019.</p> <p>4. Robert. Patton: <i>Testowanie oprogramowania</i>, Mikom, Warszawa, 20021.</p> <p>5. Mariot 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)</p> <p>6. Michał Bartyzel <i>DevOps. Inżynieria niezawodności systemów IT</i> Helion, 2020</p> |
|                     | Supplementary literature | <p>1. Andrzej Jaskiewicz, <i>Zarządzanie projektami informatycznymi</i>, PWN, 2019.</p> <p>2. Leszek Bukowski, <i>Analiza i projektowanie systemów informatycznych</i>, PWN, 2018.</p> <p>3. Adam Roman, Michał Sadowski, <i>Testowanie i jakość oprogramowania</i>, PWN, 2021.</p> <p>4. List of the accessible homepages of the selected by students IT technologies in which the group project is prepared.</p>  |
|                     | eResources addresses     |   |

|   |   |
|---|---|
| <p>Example issues/<br/>example questions/<br/>tasks being completed</p> | <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> <p>Project schedule</p> <p>Reports of the work development</p> <p>Implementation of the project</p> <p>Code review</p> <p>Testing</p> <p>Project presentattion</p> |
| <p>Practical activites within<br/>the subject</p>                       | <p>Not applicable</p>   |

Document generated electronically. Does not require a seal or signature.