

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                       |                                                          |                                                                                                                                                                                                                                                                                                              |                                     |                                                |            |     |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------|------------|-----|
| Subject name and code                       | Object Programming, PG_00198462                                                                                                                                                                                                                                                                       |                                                          |                                                                                                                                                                                                                                                                                                              |                                     |                                                |            |     |
| Field of study                              | Informatics                                                                                                                                                                                                                                                                                           |                                                          |                                                                                                                                                                                                                                                                                                              |                                     |                                                |            |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                                                          |                                                          | Academic year of realisation of subject                                                                                                                                                                                                                                                                      |                                     | 2026/2027                                      |            |     |
| Education level                             | Bachelor's studies                                                                                                                                                                                                                                                                                    |                                                          | Subject group                                                                                                                                                                                                                                                                                                |                                     | Obligatory subject group in the field of study |            |     |
| Mode of study                               | part-time studies                                                                                                                                                                                                                                                                                     |                                                          | Mode of delivery                                                                                                                                                                                                                                                                                             |                                     | at the university                              |            |     |
| Year of study                               | 1                                                                                                                                                                                                                                                                                                     |                                                          | Language of instruction                                                                                                                                                                                                                                                                                      |                                     | Polish                                         |            |     |
| Semester of study                           | 2                                                                                                                                                                                                                                                                                                     |                                                          | ECTS credits                                                                                                                                                                                                                                                                                                 |                                     | 5.0                                            |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                              |                                                          | Assessment form                                                                                                                                                                                                                                                                                              |                                     | exam                                           |            |     |
| Conducting unit                             |                                                                                                                                                                                                                                                                                                       |                                                          |                                                                                                                                                                                                                                                                                                              |                                     |                                                |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                    |                                                          | dr Tomasz Borzyszkowski                                                                                                                                                                                                                                                                                      |                                     |                                                |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                              |                                                          |                                                                                                                                                                                                                                                                                                              |                                     |                                                |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                           | Lecture                                                  | Tutorial                                                                                                                                                                                                                                                                                                     | Laboratory                          | Project                                        | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                 | 20.0                                                     | 0.0                                                                                                                                                                                                                                                                                                          | 30.0                                | 0.0                                            | 0.0        | 50  |
|                                             | 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                                                                                                                                                                                                                                                                                 | 50                                                       |                                                                                                                                                                                                                                                                                                              | 0.0                                 |                                                | 75.0       | 125 |
| Subject objectives                          | The aim of the course is to familiarise students with the principles of object-oriented and event-driven programming on the example of the Java language.To teach students the basic concepts related to object-oriented programming and the ability to construct object-oriented programmes in Java. |                                                          |                                                                                                                                                                                                                                                                                                              |                                     |                                                |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                                        |                                                          | Subject outcome                                                                                                                                                                                                                                                                                              |                                     | Method of verification                         |            |     |
|                                             | [INFOL3_U06] is able to select and apply appropriate IT methods and tools to solve complex problems, is able to use acquired knowledge by appropriately selecting sources and information derived from them, and perform evaluation, critical analysis, and synthesis of this information             |                                                          | The student is able to independently select and implement the most appropriate Java mechanisms – including dynamic data structures (collections), multithreading, and mechanisms for throwing and catching exceptions – in order to implement a secure and stable solution to a complex programming problem. |                                     | [SU2] presentation/project/paper/report        |            |     |
|                                             | [INFOL3_W05] knows and understands advanced concepts in the field of various programming paradigms and programming languages; as well as object-oriented design and programming methods and patterns                                                                                                  |                                                          | The student defines and explains advanced mechanisms of object-oriented programming (including encapsulation, interfaces, inheritance and method polymorphism), and describes the structure and purpose of selected design patterns.                                                                         |                                     | [SW2] presentation/project/paper/report        |            |     |

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| Subject contents                                               | <div>1. Introduction of basic concepts: class, object, field, method; fields and methods: static, public and private in Java; object initialisation and deletion and the so-called rubbish collector mechanism; overview of Java control instructions and their comparison with C control instructions.</div> <div>2. Java class packages - implementation hiding: package structure; importing packages; setting access rights to package components; construction of interfaces and their implementation.</div> <div>3. Inheritance and polymorphism: inheritance - syntax and preserving access rights to inherited fields and methods; from abstraction to concrete: abstract and final classes; comparison of properties of final and static fields; comparison of properties of overloaded and polymorphic methods; examples of polymorphic function calls.</div> <div>4. Overview of classes implementing common data structures: concept of static and dynamic data structures; overview of properties and provided operations on the Java Collection type and derived types (List, Set, BitSet, Maps, Vector, Stack and Hashtable); classes implementing enumeration types and iterators; polymorphic methods allowing sorting of elements stored in collections.</div> <div>5. Programming with exceptions: overview of predefined exceptions in Java; rules for creating new exceptions; exception reporting and catching.</div> <div>6. Programming using threads: concept of thread, shared resources and critical section; overview of resource sharing methods in Java: resource locking and the thread jamming problem, and priority queues and the resource access fairness problem; examples of using Java threads to implement classical critical resource access problems.</div> <div>7. Overview of selected design patterns.</div> |                                                                                                                                                                                                                                                                                                                        |                               |
| Prerequisites and co-requisites                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                        |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Passing threshold                                                                                                                                                                                                                                                                                                      | Percentage of the final grade |
|                                                                | exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 51.0%                                                                                                                                                                                                                                                                                                                  | 50.0%                         |
|                                                                | projects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 51.0%                                                                                                                                                                                                                                                                                                                  | 50.0%                         |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <div>1. Eckel B., Thinking in Java - Polish edition. Wydawnictwo HELION, Warszawa, 2010.2 Horstmann C. S., Cornell G., Core Java 2 - Fundamentals. Helion, 2010.3. Horstmann C. S., Cornell G., Core Java 2 - Advanced techniques. Helion, 2010.4. Campione M., Walrath K., Java Tutorial. Addison-Wesley, 2000.</div> |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | None                                                                                                                                                                                                                                                                                                                   |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                        |                               |
| Example issues/<br>example questions/<br>tasks being completed |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                        |                               |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                        |                               |

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