

Detailed course description (SUBJECT CARD)

Course title: Object-Relational Interfaces

Course code: IOR

Classification of a course group:

Course type: elective
Field of study: Informatics
Level of study: second-cycle
Profile of study: general academic
Mode of study: full-time programme

Specialty (specialisation):

Year of study: 1

Semester: II

Teaching modes and teaching hours:

lectures – 30;
laboratory classes – 30.

Language/s of instruction: english

Number of ECTS credits (according to the study programme):

* – leave the appropriate option

- Course objectives: The aim of the lecture is to provide students with knowledge related to object-relational interfaces, which constitute a bridge between relational databases and object-oriented design techniques and object-oriented programming languages. During laboratory classes students will learn how to use these types of interfaces (the latest version of the Hibernate library and JPA, Spring) to build Java application that cooperates with relational database and will learn how to use object-oriented elements of the Oracle database management system as well.
- Relation of the field-related learning outcomes to modes of teaching and methods of verification as well as to assessment of student's learning outcomes:

symbol	assumed learning outcomes <i>a student who completed the course:</i>	teaching modes	verification methods and learning outcomes assessment
Knowledge: a student knows and understands			
K1	A student understands notion of impedance mismatch between the object and relational world.	Lecture, Laboratory	K2A_W02
K2	A student knows the techniques to eliminate object-relational impedance.	Lecture, Laboratory	K2A_W02
K3	A student knows the techniques to improve the performance of applications using object-relational interfaces.	Lecture, Laboratory	K2A_W02
Skills: a student can			
S1	A student is able to configure libraries that map relationships to objects and is able to create mappings of objects to relationships in XML files as well as using annotations.	Lecture, Laboratory	K2A_U01
S2	A student has the ability to manipulate (create, save, modify, delete and search) permanent objects in applications that work with a relational database.	Lecture, Laboratory	K2A_U01
S3	A student is able to use appropriate mechanisms to improve performance in applications with object-relational interface.	Lecture, Laboratory	K2A_U01
Social competences: a student is prepared to			
C1	A student is aware of the problems occurring at the interface between the object and relational world.	Lecture, Laboratory	K2A_K01, K2A_K02
C2	A student can indicate which tools should be used in building object-oriented applications cooperating with a relational database.	Lecture, Laboratory	K2A_K01, K2A_K02

- The content of study programme ensuring learning outcomes (according to the study programme):

The course program includes a detailed presentation of the Hibernate framework, Java Persistence API, Spring Framework and object features of the Oracle Database.

- Description of methods of determination of ECTS credits:

Type of activity	Number of hours / ECTS credits
Number of course hours regardless of a teaching mode	

Student's workload - laboratory preparation	15
Student's workload - laboratory final report preparation	5
Student's workload - exam preparation 10	
⁵ The other** - self study	10
Total hours:	40
Number of ECTS credits allocated to a course	4

Explanation:

* – student's workload - fill in the types of activities, e.g. *preparation for a course, interpretation of results, making a course report, preparation for an exam, studying sources, making a project, presentation and report, doing written assignment, etc.*

** – the other e.g. *extra course hours*

5. Summary indexes:

- number of course hours and ECTS credits at the course with a direct participation of academic teachers or other persons running the course and supervising students;
- number of course hours and ECTS credits at the course related to the scientific activity conducted at the Silesian University of Technology in a discipline or in disciplines to which a field of study is assigned - in the case of studies with a general academic profile;
- number of course hours and ECTS credits at the course developing practical skills- in the case of practical studies;
- number of course hours conducted by academic teachers employed by the Silesian University of Technology as their primary workplace.

6. Persons conducting particular modes of courses (name, surname, academic degree or degree in arts, title of professor, business e-mail address):

Ewa Płuciennik PhD, Ewa.Pluciennik@polsl.pl

Aleksandra Werner PhD, Aleksandra.Werner@polsl.pl

Paweł Benecki MSc, Pawel.Benecki@polsl.pl

7. Detailed description of teaching modes:

1) lectures:

- detailed programme's content:
 - Introduction to object-relational interfaces
 - Hibernate configuration and integration
 - Creating a simple Hibernate application
 - XML mappings and annotations
 - Query language HQL/JPQL
 - JPA Criteria API
 - Hibernate advanced functions: filters, event capture etc.
 - Improving performance – cache, lazy loading, etc.
 - Hibernate Search
 - Spring framework, Spring Data, Spring Boot
 - Oracle database object features
 - Object – Nosql interfaces
- teaching methods, including distance learning:
 - Lecture, laboratory classes, on-line consultations with teachers
- form and criteria for semester completion, including retake tests, as well as conditions for admission to the examination:
 - successful implementation of laboratory tasks
- course organisation and rules of participation in the course, with an indication whether a student's attendance is obligatory
 - Laboratory classes: attendance is obligatory, individual or pair work. Lecture: attendance is not obligatory, but students are obligated to be familiar with subjects discussed during lectures.

2) description of other teaching modes:

self study

8. Description of the method for determining the final grade (rules and criteria for evaluation, as well as the final grade calculation method in the case of a course comprising more than one teaching mode, taking into account all teaching modes and all exam dates and credit tests including retake exams and tests):

Laboratory classes ended with lab grade LG (average of six lab classes).

The subject is ended with exam. Exam can be retaken tree times. Final exam grade (EG) is the retakes average value. Final grade (FG) is evaluated according to the following formula: $FG = (2 * EG + LG)/3$

9. Method and procedure for making up for

- student's absence from the laboratory classes should be made up in the manner agreed with the leading teacher

10. Prerequisites and additional requirements, taking into account the course sequence:

Knowledge of relational database. It is also assumed that before starting this subject, the student has at least basic preparation in the field of object-oriented programming in a Java environment.

11. Recommended sources and teaching aids:

Ottinger J. B., Linwood J., Minter D.: Beginning Hibernate: For Hibernate 5. Apress 2016

Keith M., Schincariol M., Nardone M.: Pro JPA 2 in Java EE 8: An In-Depth Guide to Java Persistence APIs. Apress 2018)

Fisher P., Murphy B.D.: Spring Persistence with Hibernate 2nd Edition, Apress 2016

Perkins S.: Hibernate Search by Example. Packt Publishing 2013

Oracle Database Application Developer's Guide - Object-Relational Features 10g Release 1 (10.1)

Goncalves A.: Beginning Java EE 6 Platform with GlassFish 3: From Novice to Professional (Expert's Voice in Java Technology). Apress, 2009.

<https://www.hibernate.org/>

<https://spring.io/projects/spring-data>

Kuaté P. H., Harris T., Bauer Ch., King G.: NHibernate in Action. Manning Publications, 2009.

Marshall K., Pytel Ch., Yurek J.: Pro Active Record. Databases with Ruby and Rails. Apress, 2007.

Fowler M., et al.: Patterns of Enterprise Application Architecture. Addison-Wesley, 2003.

Burke B. Rubiner A.: Enterprise JavaBeans 3.1. 6th Edition, O'Reilly Media. 2010.

12. Description of teachers' competences (e.g. publications, professional experience, certificates, trainings etc. related to the programme contents implemented as a part of the course):

All teachers have many years of professional experience with the technologies and tools discussed in the subject.