Universitatea Naţională de Ştiinţă şi Tehnologie Politehnica Bucureşti
Facultatea de Electronică, Telecomunicaţii şi
Tehnologia Informaţiei

COURSE DESCRIPTION

1. Program identification information

1.1 Higher education institution	**National University of Science and Technology Politehnica Bucharest**
1.2 Faculty	**Electronics, Telecommunications and Information Technology**
1.3 Department	**Applied Electronics and Information Engineering**
1.4 Domain of studies	Computers and Information Technology
1.5 Cycle of studies	Bachelor/Undergraduate
1.6 Programme of studies	Information Engineering

2. Date despre disciplină

2.1 Course name (ro) (en)				Programarea interfeţelor pentru baze de date			
2.2 Course Lecturer				S.l./Lect. Dr. Valentin PUPEZESCU			
2.3 Instructor for practical activities				S.l./Lect. Dr. Valentin PUPEZESCU			
2.4 Year of studies	3	2.5 Semester	I	2.6. Evaluation type	V	2.7 Course regime	Op
2.8 Course type		S	2.9 Course code	04.S.05.A.725		2.10 Tipul de notare	Nota

3. Total estimated time (hours per semester for academic activities)

3.1 Number of hours per week	3	Out of which: 3.2 course	2.00	3.3 seminary/laboratory	1
3.4 Total hours in the curricula	42.00	Out of which: 3.5 course	28	3.6 seminary/laboratory	14
Distribution of time:					hours
Study according to the manual, course support, bibliography and hand notes Supplemental documentation (library, electronic access resources, in the field, etc) Preparation for practical activities, homework, essays, portfolios, etc.					29
Tutoring					0
Examinations					4
Other activities (if any):					0

3.7 Total hours of individual study	33.00
3.8 Total hours per semester	75
3.9 Number of ECTS credit points	3

4. Prerequisites (if applicable) (where applicable)

4.1 Curriculum	Completion of the following disciplines: Computer programming (PC) Data structures and algorithms (SDA) Object-oriented programming (OOP)

4.2 Results of learning	General knowledge of databases, object-oriented programming and manipulation of Linux or Windows operating systems as well as software development environments such as Eclipse, Visual Studio, etc.

5. Necessary conditions for the optimal development of teaching activities (where applicable)

5.1 Course	The course will take place in a room equipped with video projector and computer.
5.2 Seminary/ Laboratory/Project	Project

6. General objective *(Reffering to the teachers' intentions for students and to what the students will be thought during the course. It offers an idea on the position of course in the scientific domain, as well as the role it has for the study programme. The course topics, the justification of including the course in the currcula of the study programme, etc. will be described in a general manner)*

The course presents the architectural aspects of the database management systems, as well as programming languages, libraries and interfaces used in the implementation and use of databases and applications for them. Thus, it presents the main technologies used in the IT industry used to create interfaces to databases. The purpose of the project applications is to make students accustomed with different database management systems (MySQL, MongoDB) and interface technologies that manipulates the data. Thus, students are involved in projects aimed at designing and implementing databases and applications that access them using various programming technologies (Java, JSP, Java Swing, JavaFX, Hibernate, Java Spring Boot, JavaScript, HTML5, Bootstrap), libraries and interfaces specific (extensions SQL, JDBC).

7. Competences *(Proven capacity to use knowledge, aptitudes and personal, social and/or methodological abilities in work or study situations and for personal and proffesional growth. They refflect the empolyers requirements.)*

Specific Competences	Demonstrates basic/advanced knowledge of databases and object-oriented programming Correlate knowledge Apply in practice the basic knowledge, concepts and methods regarding the architecture of computing systems, microprocessors, programming languages and techniques. It applies standardized methods and tools, specific to the field, to carry out the evaluation and diagnosis process of a situation, depending on the identified/reported problems, and identifies solutions. It argues and analyzes coherently and correctly the context of application of the basic knowledge of the field, using key concepts of the discipline and specific methodology. Oral and written communication in Romanian: uses the scientific vocabulary specific to the field, in order to communicate effectively, in writing and orally.

Transversal (General) Competences	Works in a team and communicates effectively, coordinating efforts with others to solve problem situations of medium complexity. Autonomy and critical thinking: the ability to think in scientific terms, search and analyze data independently, and draw and present conclusions / identify solutions. Ability to analyze and synthesize: presents the acquired knowledge in a synthetic way, as a result of a process of systematic analysis. Respect the principles of academic ethics: correctly cite the bibliographic sources used in the documentation activity. Puts elements of emotional intelligence into practice in the appropriate socialemotional management of real-life/academic/professional situations, demonstrating self-control and objectivity in decision-making or stressful situations. Methodical analysis of the problems encountered in the activity, identifying the elements for which there are established solutions, thus ensuring the fulfillment of professional tasks. Adaptation to new technologies, professional and personal development, through continuous training using printed documentation sources, specialized software and electronic resources in Romanian and, at least, in an international language.

8. Learning outcomes *(Synthetic descriptions for what a student will be capable of doing or showing at the completion of a course. The learning outcomes reflect the student's acomplishments and to a lesser extent the teachers' intentions. The learning outcomes inform the students of what is expected from them with respect to performance and to obtain the desired grades and ECTS points. They are defined in concise terms, using verbs similar to the examples below and indicate what will be required for evaluation. The learning outcomes will be formulated so that the correlation with the competences defined in section 7 is highlighted.)*

Knowledge	*The result of knowledge aquisition through learning. The knowledge represents the totality of facts, priciples, theories and practices for a given work or study field. They can be theoretical and/or factual.* • Lists the most important stages that marked the development of the field of database interfaces. • Defines notions specific to the field of databases and web interface development. • Describes and classifies the main notions in the field of database interfaces. • Highlights consequences and relationships. • The ability to constantly inform and document for personal and professional development by reading specialized literature. • Application of elementary knowledge, concepts and methods regarding the architecture of computer systems, programming languages and techniques.
Skills	*The capacity to apply the knowledge and use the know-how for completing tasks and solving problems. The skills are described as being cognitive (requiring the use of logical, intuitive and creative thinking) or practical (implying manual dexterity and the use of methods, materials, tools and intrumentation).* • Selects and groups relevant information in a given context. • Reasonably uses specific principles in order to build complex web applications. • Work productively in a team. • Experimentally verifies identified solutions. • Solve practical applications. • Adequately interpret causal relationships. • Analyze and compare the various technologies presented in the course on building interfaces to databases. • Identifies solutions and develops project plans. • Formulates conclusions to the experiments carried out. • Argue the identified solutions/solutions.

Responsability and autonomy	*The student's capacity to autonomously and responsably apply their knowledge and skills.* • Select appropriate bibliographic sources and analyze them. • Respect the principles of academic ethics, correctly citing the bibliographic sources used. • Demonstrates responsiveness to new learning contexts. • Demonstrates collaboration with other colleagues and teaching staff in carrying out teaching activities • Demonstrates autonomy in organizing the learning situation/context or the problem situation to be solved • Demonstrates social responsibility through active involvement in student social life/involvement in academic community events • Promotes/contributes through new solutions related to the specialized field to improve the quality of social life. • Realizes the value of his contribution in the field of engineering to the identification of viable/sustainable solutions to solve problems in social and economic life (social responsibility). • Apply principles of professional ethics/deontology in the analysis of the technological impact of the proposed solutions in the specialized field on the environment. • Analyzes and capitalizes on business/entrepreneurial development opportunities in the specialized field. • Demonstrates real-life situation management skills (collaborative vs. conflict time management).

9. Teaching techniques *(Student centric techniques will be considered. The means for students to participate in defining their own study path, the identification of eventual fallbacks and the remedial measures that will be adopted in those cases will be described.)*

Starting from the analysis of students learning characteristics and their specific needs, the teaching process will explore both expository (lecture, exposition) and conversational-interactive teaching methods, based on discovery learning models facilitated by direct exploration and indirect of reality (experiment, demonstration, modelling), but also on action-based methods, such as exercise, practical activities and problem solving.
In the teaching activity, lectures will be used, based on Power Point presentations or different videos that will be made available to the students. Each course will start with a recap of the chapters already covered, with an emphasis on the concepts covered in the last course.
Presentations use images and diagrams so that the information presented is easy to understand and assimilate.
This discipline covers information and practical activities designed to support students in their learning efforts and the development of optimal collaborative and communicative relationships in a climate conducive to discovery learning.
It will be considered the practice of active listening and assertive communication skills, as well as feedback construction mechanisms, as ways of regulating behavior in various situations and adapting the pedagogical approach to the students' learning needs.
Teamwork skills will be used to solve different learning tasks.

10. Contents

COURSE		
Chapter	**Content**	**No. hours**
1	Basic concepts of object-oriented programming that will be used to build interfaces to various database management systems.	2

2	Basic concepts of relational databases necessary for project development. Introducing the MySql Workbench utility. Building applications in Java that access a database stored in the MySql database management system.	6
3	Presentation of the operations that can be performed on a relational database (union, intersection, difference and junction). These are performed both in mysql and in implementations in the Java programming language.	4
4	Building a web application. Presentation of NetBeans and Eclipse platforms. Presentation of Jakarta Server Pages technology. Building a web application that performs CRUD operations on a database that contains data tables in M:N relationship. JSP, HTML5 and JDBC technologies are used to build the application.	4
5	Introducing Java FX technology. Building a simple stand alone application for assimilating the basics of Java FX. Building an application in Java FX technology that allows performing CRUD operations on a database implemented in MySql.	2
6	Introducing Java FX technology. Building a simple stand alone application for assimilating the basics of Java FX. Building an application in Java FX technology that allows performing CRUD operations on a database implemented in MySql.	2
7	Presentation of the object-relational mapping platform (ORM - Object Relational Mapping) Hibernate. Building applications that perform simple operations on a relational database.	2
8	Building a web application using Jakarta Server Pages, HTML5, JavaScript, Bootstrap, Java Spring Boot and Hibernate ORM technologies that perform CRUD operations on a database implemented in the MySql database management system.	4
9	Presentation of the non-relational data model (NoSQL). The examples will be made using the MongoDB non-relational database management system. Creation of Java applications that perform CRUD operations on NoSQL databases.	2
	Total:	28

Bibliography:

[1] Jakarta Server Pages 3.1 Specification. Jakarta Specification Project, 2022. [Online]. Available: https://jakarta.ee/specifications/pages/3.1/
[2] C. Bauer and G. King, *Hibernate in Action*. Greenwich, CT, USA: Manning Publications, 2004.
[3] P. J. Deitel, H. M. Deitel, and S. Santry, *Spring Boot in Action*, 2nd ed. Shelter Island, NY, USA: Manning Publications, 2021.
[4] MongoDB Documentation. MongoDB, Inc., 2023. [Online]. Available: https://www.mongodb.com/docs/manual/

Bibliography:

11. Evaluation

Activity type	11.1 Evaluation criteria	11.2 Evaluation methods	11.3 Percentage of final grade

11.4 Course	Knowledge of the fundamental notions of SQL as well as the technologies for creating interfaces to relational and non-relational databases.	Final check (project documentation) in which students present a larger project. They have to create two interfaces to a relational database. Students will use two programming technologies with the help of which they will allow performing CRUD type operations on a previously established database during the project hours	20%
11.5 Seminary/laboratory/project	The correct design of a database of medium level of complexity;	The score is obtained throughout the year depending on the work done within the project hours to complete the required applications.	10%
	Creation of an interface to a database made with the help of Jakarta Server Pages, HTML5, Hibernate, Java Spring Boot, JavaFX technologies.	The score is obtained throughout the year depending on the work done within the project hours to complete the required applications.	70%
11.6 Passing conditions			
Obtaining 50% of the total score.			

12. Corroborate the content of the course with the expectations of representatives of employers and representative professional associations in the field of the program, as well as with the current state of knowledge in the scientific field approached and practices in higher education institutions in the European Higher Education Area (EHEA)

The applied technologies for the implementations and the management of databases through interfaces are very important because of their ability to manipulate vital user data. The discipline "Programming of Interfaces for Databases" provides critical information for designing, implementing and managing relational and non relational databases through interfaces implemented with new programming technologies. The course offers the latest information about new technologies for students in order to be well prepared for employment.

Date	Course lecturer	Instructor(s) for practical activities
25.09.2025	S.l./Lect. Dr. Valentin PUPEZESCU	S.l./Lect. Dr. Valentin PUPEZESCU

Date of department approval	Head of department

Universitatea Națională de Știință și Tehnologie Politehnica București
Facultatea de Electronică, Telecomunicații și
Tehnologia Informației

Conf.Dr.Ing. Bogdan Cristian FLOREA

Date of approval in the Faculty Council	Dean
26.09.2025	Prof. Dr. Mihnea Udrea