**SYLLABUS**

**regarding the qualification cycle FROM 2023 TO 2024**

1. Basic Course/Module Information

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| Course/Module title | Databases |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | College of Natural Sciences |
| Name of the unit running the course | Institute of Computer Science |
| Field of study | Computer Science & Computer Science and Econometrics |
| Qualification level | First degree |
| Profile | Academic |
| Study mode | Full-time |
| Year and semester of studies | Year 2, semester 3 |
| Course type | Major engineering |
| Language of instruction | English |
| Coordinator | Barbara Pękala, PhD, DSc |
| Course instructor | Barbara Pękala, PhD, DSc |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester  (n0.) | | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | | Internships | others | **ECTS credits** |
| 3 |  | |  |  | 30 |  |  |  | |  | 5 |

1.2. Course delivery methods

X - conducted in a traditional way

X - involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

pass with grade after sem. 3 and exam after sem. 4

2. Prerequisites

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| Understanding the rules of processing basic and complex data types in any procedural language. The basics of programming. |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

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| --- | --- |
| O1 | Providing knowledge and skills in the design and operation of database systems, using structural and procedural languages. |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

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| --- | --- | --- |
| Learning Outcome | The description of the learning outcome  defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | The student knows the basic methods of relational database design well, knows well the SQL language and the selected programming language of procedural databases. | K\_Wo7 |
| LO\_02 | Is able to implement a simple data processing project inside a database using stored procedures.  The student can create and operate databases. He can translate the language of business inquiries into data mining tasks. | K\_U07, K\_U11-K\_U12, K\_U20 |

**3.3. Course content (to be completed by the coordinator)**

1. Lectures

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| Content outline |
| Introduction to database systems. Relational data model: data structures, limitations resulting from data integrity, operations.  Conceptual modeling: the ERD model. Transformation from conceptual to relational model. Normalization and denormalization of the relational database schema.  Data description language, discussion of the syntax of the DDL language. Creation, modification and destruction of individual database objects.  Language of data manipulation, commands and syntax of the DML language. Data integrity, integrity bonds management. Indexes and database optimization.  SQL language, projection, selection, grouping, sorting, connection, sum, product, difference, subqueries, correlated queries.  Selected SQL functions: numeric, character, dates, conversions, conditional.  Information security issues in database management systems. Data access rights management, permission levels. |

1. Classes, tutorials/seminars, colloquia, laboratories, practical classes

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| Content outline |
| Conceptual modeling: the ERD model. Transformation from conceptual to relational model. Normalization and denormalization of the relational database schema.  Data description language, discussion of the syntax of the DDL language. Creation, modification and destruction of individual database objects. Language of data manipulation, commands and syntax of the DML language. Data integrity, integrity bonds management.  SQL language, projection, selection, grouping, sorting, connection, sum, product, difference, subqueries, correlated queries.  Selected SQL functions: numeric, character, dates, conversions, conditional. |

3.4. Methods of Instruction

e.g.

*Lecture: a problem-solving lecture/a lecture supported by a multimedia presentation/ distance learning*

*Classes: text analysis and discussion/project work (research project, implementation project, practical project)/ group work (problem solving, case study, discussion)/didactic games/ distance learning*

*Laboratory classes: designing and conducting experiments*

Lecture with multimedia presentation.

Laboratory: designing experiences (databases) and performing experiments (database support - problem simulations).

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

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| --- | --- | --- |
| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01 | written test | classes |
| LO-o2 | written test, observation during classes | classes |

4.2 Course assessment criteria

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| Completion of laboratories is based on two tests.  Rating from the laboratory, requirements:  **Sufficient (3.0):**  - Student is able to identify entities for a given slice of reality,  - gives the names of these entities, specify the attributes of the entity and correctly determine their type.  - The student knows the structure of the SQL query and is able to identify the tasks of particular clauses describing this structure.  - On the basis of a given question in colloquial speech - the student is able to develop a simple selection query and aggregation, based on 1 ... n source tables, can use procedural language, variable definition, control command handling and calling functions of the embedded database system, can generate simple GUI with the use of a generator in the selected application creation tool.  - Student understands the concept of entity, attributes of entities and relationships. He can use selected graphic notation in this area. The student knows the structure of SQL-selecting queries. The student knows the structure of aggregate queries. The student knows the structure of the procedural language block, as well as instructions controlling the course of the program. The student knows the support of the form generator in the selected application creation tool.  **Good (4.0):**  - The student meets criterions of rating 3.0 and in addition:  - can bring the diagram of entity associations to form 2 and 3 normal, can generate a DDL script for a given ERD diagram and implement it in a selected database management system,  - is able to formulate a SQL query to the database using nested queries, using nested subqueries, knows and uses formulas built into the database system, in terms of text processing, date format conversion and numerical values,  - knows the concept of 2 and 3 of the normal form of the ERD model, knows the structure of DDL commands in the scope of ERD model implementation in the database, knows the construction rules and structure of nested queries, knows built-in functions in the field of text processing and numeric formats conversion and date.  **Very good (5.0):**  The student meets the criterion of a good grade and also:  - can bring the entity relationship diagram to the normal Boyce-Codd form, correctly uses the DDL language in the reconfiguration of the database structure.  - can formulate correlated queries, can create in its procedural language own packages.  - knows the concepts of 3 and 4 of the normal form of the ERD and Boyce-Codd model, knows the semantics of DDL commands in the field of reconfiguration of the database structure, knows the structure of correlated queries. |

5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

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| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | 30 |
| Other contact hours involving the teacher (consultation hours, examinations) | 2 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 95 |
| Total number of hours | 127 |
| Total number of ECTS credits | 5 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

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| --- | --- |
| Number of hours | *--------------* |
| Internship regulations and procedures | *---------------* |

7. Instructional materials

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| Compulsory literature:  1. Database management : objectives, system functions and administration / Gordon C. Everest. - New York : McGraw-Hill, cop. 1986.  2. DATABASE MANAGEMENT SYSTEMS, Tibor Radványi, http://aries.ektf.hu/~dream/e107/e107\_files/downloads/dbms.pdf |
| Complementary literature:  1.Database Management System, http://vulms.vu.edu.pk/Courses/CS403/Downloads/CS403%20Handouts.pdf |

Approved by the Head of the Department or an authorised person