

| Białystok University of Technology                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   |                                 |                                                           |  |
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| Field of study                                                          | Computer Science                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |    |   |    |    |   | Degree level and programme type | Engineer's degree full-time programme                     |  |
| Specialization/ diploma path                                            | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |    |   |    |    |   | Study profile                   | academic                                                  |  |
| Course name                                                             | Introduction to Databases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |    |   |    |    |   | Course code                     | FCS-00096                                                 |  |
|                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   | Course type                     | obligatory                                                |  |
| Forms and number of hours of tuition                                    | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | C | LC | P | SW | FW | S | Semester                        | 3                                                         |  |
|                                                                         | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |    |   | 30 |    |   | No. of ECTS credits             | 6                                                         |  |
| Entry requirements                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   |                                 |                                                           |  |
| Course objectives                                                       | Lecture: To acquaint students with the process of creating a relational database. Teaching how to write SQL queries to extract data from tables. Acquainting with the basics of database operation: physical organization of data in a database, indexes, and transactions.<br>SW: Developing the ability to create a relational database and writing SQL queries. Teaching the basics of creating new tables and views, modifying tables structures, and inserting the data.                                                                                                                                  |   |    |   |    |    |   |                                 |                                                           |  |
| Course content                                                          | Lecture:<br>Introduction to databases; Relational algebra; Integrity constraints; SQL queries; Stages of designing a relational database. Normalization of relations; Entity-relationship diagrams; Creating the relational database scheme from E/R diagrams; Defining views; The physical organization of data in the database; Indexes. DDL and DML; Query optimization; Transactions.<br>Sw:<br>1. Normalization of a relational database.<br>2. SQL queries: simple queries, subqueries, grouping queries, correlated queries, subqueries after FROM and SELECT.<br>3. Views.<br>4. DDL and DML commands. |   |    |   |    |    |   |                                 |                                                           |  |
| Teaching methods                                                        | informative lecture, lecture problem, programming, subject exercises,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |    |   |    |    |   |                                 |                                                           |  |
| Assessment method                                                       | Lecture - written exam; specialistic workshop - tests, short tests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |    |   |    |    |   |                                 |                                                           |  |
| Symbol of learning outcome                                              | Learning outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |    |   |    |    |   |                                 | Reference to the learning outcomes for the field of study |  |
| L01                                                                     | knows the rules and is able to create a relational database schema.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |    |   |    |    |   |                                 | K_W07<br>K_U07                                            |  |
| L02                                                                     | can write SQL queries to any relational database.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |    |   |    |    |   |                                 | K_W07<br>K_U07                                            |  |
| L03                                                                     | can use the DDL and DML to construct and modify a relational database schema.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |    |   |    |    |   |                                 | K_U07                                                     |  |
| L04                                                                     | describes the basics of relational database systems, mainly indexes, transactions and query optimization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |    |   |    |    |   |                                 | K_W07                                                     |  |
| Symbol of learning outcome                                              | Methods of assessing the learning outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |    |   |    |    |   |                                 | Type of tuition during which the outcome is assessed      |  |
| L01                                                                     | Exam, project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |    |   |    |    |   |                                 | L, Sw                                                     |  |
| L02                                                                     | Exam, test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |    |   |    |    |   |                                 | L, Sw                                                     |  |
| L03                                                                     | Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |    |   |    |    |   |                                 | Sw                                                        |  |
| L04                                                                     | Exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |    |   |    |    |   |                                 | L                                                         |  |
| Student workload (in hours)                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   | No. of hours                    |                                                           |  |
| Calculation                                                             | 1 - Attendance at lectures -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |    |   |    |    |   |                                 | 30                                                        |  |
|                                                                         | 2 - Attendance at specialistic workshops -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |    |   |    |    |   |                                 | 30                                                        |  |
|                                                                         | 3 - Preparation for specialistic workshops -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |    |   |    |    |   |                                 | 25                                                        |  |
|                                                                         | 4 - Doing homework -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |    |   |    |    |   |                                 | 30                                                        |  |
|                                                                         | 5 - Participation in student-teacher sessions -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   |                                 | 5                                                         |  |
|                                                                         | 7 - Preparation for exam -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |    |   |    |    |   |                                 | 8                                                         |  |
|                                                                         | 8 - Presence during exam -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |    |   |    |    |   |                                 | 2                                                         |  |
|                                                                         | 9 - Preparation for tests -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |    |   |    |    |   |                                 | 20                                                        |  |
|                                                                         | TOTAL:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |    |   |    |    |   |                                 | 150                                                       |  |
| Quantitative indicators                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   | HOURS                           | No. of ECTS credits                                       |  |
| Student workload - activities that require direct teacher participation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   | 67<br>(2)+(1)+(5)+(8)           | 2.7                                                       |  |
| Student workload - practical activities                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |   |    |    |   | 105<br>(9)+(4)+(3)+(2)          | 4.2                                                       |  |
| Basic references                                                        | 1. T. Connolly., C. Begg, Database Systems: A Practical Approach to Design, Implementation and Management, 4th edition, Addison Wesley, 2005<br>2. L. Soren, SQL and relational databases, San Marcos: Microtrend Books, 1991.                                                                                                                                                                                                                                                                                                                                                                                 |   |    |   |    |    |   |                                 |                                                           |  |
| Supplementary references                                                | 1. T. Kyte, Expert Oracle Database Architecture: Oracle Database 9i, 10g, and 11g Programming Techniques and Solutions, 2nd edition, APress 2010                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |    |   |    |    |   |                                 |                                                           |  |
| Organisational unit conducting the course                               | Software Department                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |    |   |    |    |   |                                 | Date of issuing the programme                             |  |
| Author of the programme                                                 | dr hab. inż. Agnieszka Drużdżel, dr hab. inż. Małgorzata Krętowska                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |    |   |    |    |   |                                 | Feb. 17, 2022                                             |  |

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work, S – seminar