## 1.3. Module/ course form

| To be completed by Course Team | | | | | | | |
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| | Module name :<br>DATABASES | | | | | Module code: M9 | |
| | Course name:<br>Databases | | | | | Course code: | |
| | Faculty:<br>**The Institute of Applied Informatics** | | | | | | |
| | Field of study:<br>**Informatics** | | | | | | |
| | Mode of study :<br>**Full-time** | | Learning profile:<br>**PRACTICAL** | | | Speciality: | |
| | Year/ semester:<br>2/3 | | Module/ course status:<br>**mandatory** | | | Module/ course language:<br>**polish/anglish** | |
| | Type of classes | lecture | lessons | lab | project | tutorial | other (please specify) |
| | Course load | **30** | | **30** | | | |

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| Module/ course coordinator | **dr inż. Jerzy Buriak** |
| Lecturer | **dr inż. Jerzy Buriak, dr inż. Robert Fidytek** |
| Module/ course objectives | Providing information about the terminology in the field of databases;<br>Learning the mapping of real-world objects to the logical structure of relational databases; database normalization;<br>Learning practical use of the relational database management system and manipulation of data using SQL;<br>Learning how to define data structures and database objects. |
| Entry requirements | |

| **LEARNING OUTCOME** | | |
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| Nr | LEARNING OUTCOME DESCRIPTION | Learning outcome reference |
| 1 | Student uses the fundamental definitions of databases. | K_W05<br>K_W14 |
| 2 | The keywords, operators and functions of the SQL language are implemented in data manipulation queries and in structure definition queries. | K_W05<br>K_W14 |
| 3 | Student identifies the types of data and implements many kinds of SQL and DBMS functions, particularly: aggregate functions, mathematical functions, system functions, date and time functions, type conversion functions and text functions. | K_W05<br>K_W07<br>K_W14 |
| 4 | Student is organizing the fields and tables of a relational database to minimize redundancy and dependency. | K_U07<br>K_U18 |

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| 5 | Student constructs SQL queries for the projection and selection of data from the database. | K_U18 |
| 6 | Tables, sequences, views, triggers, functions and rules are created effectively by a student. | K_U18 |
| 7 | Critically determines the scope of own knowledge and skills. | K_K01 |
| 8 | Student declares the need for continuous training and professional development. | K_K01 |
| 9 | Works in a group taking the different roles. | K_K04 |

**CURRICULUM CONTENTS**

**Lecture**

1. Introduction and fundamental definitions like: attribute, entity, database, database system, database management system, data, data types
2. Relational model of data: record of data, field, table, primary key, foreign key, relation, entity relationship diagram
3. Description of data models. Hierarchical and network model of data. Relational and object data model.
4. Algebra in relational database.
5. SQL language – genesis, standard ANSI version of SQL, groups of SQL commands, general construction of SQL queries
6. SQL language – DML commands: SELECT command and their clauses, operators, aggregation functions, practical examples.
7. SQL language – DML commands: joins of tables, subqueries, practical examples
8. SQL language – DML commands: INSERT, UPDATE and DELETE commands, practical examples
9. Introduction to data definition language (DDL group of commands in SQL)
10. Database normalization.
11. Introduction to postgreSQL database management system. Description of psql process
12. PostgreSQL data types. CREATE TABLE command with INHERITS and LIKE clauses
13. Various ALTER TABLE queries
14. Sequence parameters, SERIAL data type.
15. Date and time functions, time zones, format of the date, system functions.
16. Mathematical functions, system functions, type conversion functions and text functions.
17. CREATE VIEW command. CREATE RULE command.
18. Transactions.
19. Introduction to PL/pgSQL language. Example of triggers and trigger functions.

**Tutorial**

The purpose of the lab is the practical application of the knowledge acquired during the lecture, skills acquisition in data manipulation using SQL and in database normalization.
Laboratory program includes:
• introduction to MS Access database and 'MS SQL Server' database;
• compose and execute SQL queries in the query editor in SQL Server Management Studio, covering issues such as selection, projection, formatting, aggregation functions, SQL Server built-in functions, grouping, joins, subquery, modification of data;
• definition of data source and a sample data migration;
• introduction to postgreSQL. Design of own database with tables, sequences, primary and foreign key constraints, views, triggers and functions.
During labs and own work in home the Microsoft IT Academy teaching materials are used. The "Querying SQL Server" course of Microsoft IT Academy is implemented.

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| Basic literature | 1. Eric Johnson, Joshua Jones A Developer's Guide for Data Modeling in SQL Server 2005 i 2008. Publication Date: July 4, 2008 \| ISBN-10: 0321497643 \| ISBN-13: 978-0321497642 \| Edition: 1<br>2. Judith S. Bowman , Sandra L. Emerson , Marcy Darnovsky: The Practical SQL Handbook. ISBN: 83-204-2596-4, Published July 6th 2001 by Addison-Wesley Professional<br>3. C. J. Date. Database Design and Relational Theory O'Reilly Media. Released: April 2012.<br>4. J. D. Ulman. Database Systems: The Complete Book. 2ed Edition Published in 2008 by Prentice Hall<br>5. "Querying SQL Server" course of Microsoft IT Academy |
| Additional literature | 1. Richard Stones, Neil Matthew: Beginning Databases with PostgreSQL: From Novice to Professional. Publisher: Apress, ISBN: 1590594789, edition 2005 |

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| Teaching methods | 1) lecture / lecture with multimedia presentation<br>2) exercises in auditorium with implementation of the project method for practical tasks<br>3) work in group of students (case studies, solving of the problems)<br>4) exercises in computer laboratory<br>5) housework.<br>6) blended-learning |

| Assessment method | Learning outcome number |
|---|---|
| Practical task – implementation in couples | 01,04,09 |
| Housework – SQL implementation | 02,03,05,06,07 |
| Exam | 01,08 |
| Kolokwium | 02,03,05,06 |

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| Form and terms of an exam | The components of the final grade of the course:<br>• 50% of the evaluation is based on test results of theoretical issues cognized the lecture;<br>• 50% of the assessment is the result of laboratory credit.<br>The result of the laboratory credits include:<br>• 20% of the test in designing the logical structure of standard models for the selected database problems;<br>• 20% of the SQL test SQL;<br>• 10% homework and reports.<br>Evaluation of the subject more than 72% entitle to receive a certificate of completion of the Microsoft IT Academy course. |

| **STUDENT WORKLOAD** | |
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| | Number of hours |
| Participation in lectures | 30 |
| Independent study of lecture topics | 5 |
| Participation in tutorials, labs, projects and seminars | 30 |
| Independent preparation for tutorials* | 15 |
| Preparation of projects/essays/etc.* | |
| Preparation/ independent study for exams | 5 |
| Participation during consultation hours | 5 |
| Other | |

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| **TOTAL student workload in hours** | 90 |
| **Number of ECTS credit per course unit** | **3 ECTS** |
| Number of ECTS credit associated with practical classes | **65**<br>**2,2 ECTS** |
| Number of ECTS for classes that require direct participation of professors | 65<br>**2,2 ECTS** |