

SYLLABUS OF A MODULE

Polish name of a module	Bazy Danych
English name of a module	Databases
ISCED classification - Code	0612
ISCED classification - Field of study	<i>Database and network design and administration</i>
Languages of instruction	<i>English</i>
Level of qualification: <i>1 – BSc (EQF 6)</i> <i>2 – MSc (EQF 7)</i> <i>3 – PhD (EQF 8)</i>	<i>1</i>
Number of ECTS credit points	<i>6</i>
Examination: <i>EO – exam oral</i> <i>EW – exam written</i> <i>A - assignment</i>	<i>EW</i>
Available in semester: <i>S – Spring only</i> <i>A – autumn only</i> <i>Y - booth</i>	<i>A</i>

Number of hours per semester:

Lecture	Exercises	Laboratory	Seminar	E-learning	Project
30	0	30	0	0	15

MODULE DESCRIPTION

MODULE OBJECTIVES

- O1. Acquiring knowledge about models, stages of database design, and maintaining data consistency, ensuring their security.
- O2. Knowing the SQL language.
- O3. Students acquire practical skills in database design, operating database management systems, searching, updating data and creating data structures.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of logic, algebra, and basic programming.
2. Ability to construct logical conditions and recognize relationships between data.
3. Ability to use various sources of information, including manuals and technical documentation.
4. Ability to work independently and in a team.

LEARNING OUTCOMES

- LO 1 – The student has general knowledge related to relational and other databases currently

used, has knowledge of data models and database management systems.

LO 2 – The student has the ability to obtain information from the database and optimize the queries performed for this purpose, also has the ability to design and implement the database, taking into account integrity constraints.

LO 3 – The student has the competence to critically assess knowledge, recognizes the importance of knowledge in solving cognitive and practical problems, understands the need for continuous training, raising professional, personal and social competences

MODULE CONTENT

Type of classes – lecture	Number of hours
Lec 1 - Introduction to databases	2
Lec 2 - Relational data model	2
Lec 3 - Relational data integrity	2
Lec 4 - Introduction to the SQL language	2
Lec 5 - DML – queries	2
Lec 6 - DML – complex queries and data modification	2
Lec 7 - Stages of database design	2
Lec 8 - Normal forms	2
Lec 9 - Entity-relationship model	2
Lec 10 - Logical modeling	2
Lec 11 - Transactions in databases	2
Lec 12- Physical design	2
Lec 13 - DDL – defining, modifying and deleting data structures	2
Lec 14 - Query optimization	2
Lec 15 - Query optimization	2
Sum	30
Type of classes– laboratory.	Number of hours
Lab 1 - Introduction to SQL Developer, basic query syntax in SQL	2
Lab 2 - Projection and selection in queries, aliases and NULL support	2
Lab 3 - Strings support in SQL, row functions – text and mathematics	2
Lab 4 - Functions operating on dates and converting functions	2
Lab 5 - Aggregation of data and the use of aggregate functions	2
Lab 6 - The use of relationship joins, collective operators for relationships	2
Lab 7 - Subqueries	2
Lab 8 - Test	2
Lab 9 - Data modification	2
Lab 10 - Transaction support	2
Lab 11 - Creating table structures with integrity constraints	2
Lab 12 - Modification of existing structures	2
Lab 13 - Creating sequences, indexes, views	2
Lab 14 - Query optimization	2
Lab 14 - Test	2
Sum	30
Type of classes– project.	Number of hours
P 1 - Assignment of tasks, division into research teams, establishing conditions	1
P 2-3 - Creating an entity relationship model for a selected topic – report	2
P 4 - Evaluation of work to date and oral defense of the report	1
P 5-8 - Transition to a logical-relational model, constraint analysis, Selection of optimal types. Selection of optimal solutions for converting relationships, hierarchies, and subtypes into relationships.	4
P 9 - Evaluation of work to date and oral defense of the report	1

P 10-11 - Implementation of tables and integrity constraints	2
P 12 - Implementation of objects that optimize database operation	1
P 13 - Data insertion and query testing	1
P 14 - Planning users and their privileges	1
P 15 - Evaluation of work to date and oral defense of the final report	1
Sum	15

TEACHING TOOLS

1. - Multimedia presentations for lectures, the course may also be conducted via the PCz e-learning platform.
2. - Instructions for laboratories and projects, the course may also be conducted via the PCz e-learning platform.
3. - Computer laboratory equipped with individual workstations with Oracle software.

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE

F1. - assessment of activity during classes.
S1. - assessment verifying the ability to solve the problems posed – pass the 1st and 2nd test.
S2. - assessment verifying the skills to solve the problems posed – pass the project .
S3. - assessment verifying knowledge about the content provided on the lecture (exam)*.

*) in order to receive a credit for the module, the student is obliged to attain a passing grade in all laboratory classes as well as in achievement tests.

STUDENT'S WORKLOAD

L.p.	Forms of activity	Average number of hours required for realization of activity
1. Contact hours with teacher		
1.1	Lectures	30
1.2	Tutorials	0
1.3	Laboratory	30
1.4	Seminar	0
1.5	Project	15
1.6	Examination	2
Total number of contact hours with teacher:		77
2. Student's individual work		
2.1	Preparation for tutorials and tests	0
2.2	Preparation for laboratory exercises, writing reports on laboratories	10
2.3	Preparation of project	14
2.4	Preparation for final lecture assessment	0
2.5	Preparation for examination	18
2.6	Individual study of literature	31
Total number of hours of student's individual work:		73
Overall student's workload:		150
Overall number of ECTS credits for the module		6 ECTS

Number of ECTS points that student receives in classes requiring teacher's supervision:	3,1 ECTS
Number of ECTS credits acquired during practical classes including laboratory exercises and projects:	2,8 ECTS

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. C. J. Date, An Introduction to Database Systems (last edition)
2. C. J. Date, SQL and Relational Theory. How to Write Accurate SQL Code. 3rd Edition, O'Reilly Media, 2015
3. C. J. Date, Type Inheritance and Relational Theory, O'Reilly Media, 2016
4. H. Garcia-Molina, J.D. Ullman, J. Widom, Database Systems: The Complete Book (2nd edition), Pearson 2008
5. J.D. Ullman, J. Widom, A First Course in Database Systems, Prentice Hall, 1997, ISBN-10: 0138876479 ISBN-13: 978-0138876470
6. R. K. Stephens, R. R. Plew, Database design, Sams 2000, ISBN-10 : 0672317583, ISBN-13 : 978-0672317583
7. D. Tow, SQL tuning: Generating Optimal Execution Plans, O'Reilly Media, 2003, ISBN-10: 0596005733 ISBN-13: 978-0596005733
8. M.J. Hernandez, Database Design for Mere Mortals: A Hands-On Guide to Relational Database Design https://docs.oracle.com/en/database/oracle/oracle-database/19/books.html
9. J.L. Viescas, D.J. Steele, B.G. Clothier, SQL Queries for Mere Mortals, Addison Wesley, 2018
10. J. Gennick, SQL Pocket Guide, last edition
11. Lazarska M., Siedlecka-Lamch O., Comparative study of relational and graph databases, in Proc. IEEE 15th International Scientific Conference on Informatics, IEEE, 234-241, 2019

MODULE COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

dr inż. Olga Siedlecka-Lamch, Department of Computer Science, olga@icis.pcz.pl (author) dr inż. Szymon Berski, Department of Computer Science, sberski@icis.pcz.pl (coordinator)
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