Subject programme

1. Subject name / subject module: **Databases**
2. Lecture language: **English**
3. The location of the subject in study plans**:**
   - Area or areas of the studies: **Computer Engineering and Mechatronics**
   - Degree of the studies: **1st degree studies**
   - Ftield or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Bartoszak Rafał, mgr inż.**
   - People cooperating in the development of the programme of the subject:
5. The number of hours and forms of teaching for individual study system and the evaluation method:

Teaching activities with the tutor																						
Mode of study	Form of classes																					Total
		SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				32	43	3																3
Part-time studies																						
Credit rigor				Graded assignment																		

6. Student workload – ECTS credits balance:

   1 ECTS credit corresponds to 25-30 hours of student work needed to achieve the expected learning outcomes including the student's own work

Activity (please specify relevant work for the subject)	**Hourly student workload (full-time studies/part-time studies)**
Participation in lectures	-
Participation in laboratory classes	32
Preparation to laboratory classes	20
Independent study of the subject	21
Participation in an exam / graded assignment	2
Total student workload (TSW)	75
ECTS credits	3
* Student's workload related to trainings	75
Student's workload in classes requiring direct participation of academic teachers	32

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:
   - Recommended admission requirements – none.
   - Recommended duration of the subject is taken from the course plan.
8. Specific learning outcomes – knowledge, skills and social competence:

Specific learning outcomes for the subject		**Form**	**Teaching method**	**Methods for testing of (checking, assessing) learning outcomes**
Outcome symbol	**Outcome description**			
Knowledge				
K_W04	**A student has a general knowledge of the architecture of database systems, modeling and SQL, necessary for database design. Student has a knowledge of the database market - database models, manufacturers. Student understands when a relational database is be**	**Laboratory work**	**Inquiry methods**	**Student learning activities**
K_W10	**A student understands the client-server architecture, basic elements of database administration and security of databases.**			
Skills				
K_U02	**A student has knowledge of data processing with the SQL language, can write scripts for creating database objects and for data processing.**	**Laboratory work**	**Inquiry methods**	**Student learning activities**

9. Assessment rules / criteria for each form of education and individual grades:

0% - 50%	ndst	**80% - 86%**	db
51% - 70%	dst	**87% - 93%**	db+
71% - 79%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Tasks done during laboratory classes	dst, db, bdb, db (3,4,5,4)	arithmetic mean (3,4,5,4) * 90%	3,6
Attendance	on 70% of all classes	70% * 5 -> 3,5 * 10%	0,35
Final result			3,95
Grade		3,95/5 = 79%	**db (4.0)**

10. The learning contents with the form of the class activities on which they are carried out:

(Laboratory work)

1. Introduction to Basic Database Concepts;

2. Database Architecture. Database Planning;

3. Data Storage Mechanisms;

4. Process of Database Design;

5. Relational Database;

6. Conceptual Data Modeling;

7. Entity Relationship Diagram;

8. Entities, Attributes and Relationship;

9. EER Diagram;

10. Normalization and Denormalization;

11. SQL as a database language: DML constructs in SQL: SELECT phrase as a specification of a se-quence of operations on tables;

12. Syntax and semantics of basic SELECT phrases, conceptual processing order of sections (clauses);

13. Acceptable expressions in particular clauses;

14. Nested constructs: correlated and uncorrelated sub-queries;

15. Principles of formulating queries in the form of SELECT expressions: equivalent forms;

16. Declarative and procedural semantics of the SELECT expressions;

17. Three-valued logic in SQL: a problem of NULL values, anomalies resulting from NULL values;

18. Designing relational databases - revisited Notion of a key of relation, functional dependencies, Armstrong axioms, schemata decomposition, normal forms 1NF, 2NF, and 3NF, normalization of relational schema;

19. Multivalued dependencies, 4NF. Mapping of ER to relational model;

20. Defining domain and semantic integrity constraints;

21. Description of database structure by means of data dictionary;

22. Physical level of data: Record storage formats, storage of fixed length and variable length data, indexing structures, primary and secondary indexes, hash coding, ISAM, B-tree family data struc-tures, operations on the indexes;

23. Transaction processing : the concept of transaction, state diagram for transaction execution (commit, rollback, etc.), execution schedule, serializability of the schedule, testing serializability, concurrency control, locking mechanisms, protocols , time stamping

11. Required teaching aids:

a. Lecture - multimedia projector

b. Laboratory classes - specialist laboratory

12. Literature:

a. Basic literature:

- Churcher C.: Beginning SQL Queries, Apress, Berkeley, 2016.
- Dewson R.: Beginning SQL Server for Developers, Apress, Berkeley, 2015.
- McQuillan M.: Introducing SQL Server, Apress, Berkeley, 2015.

b. Supplementary literature:

- Converse T., Park J., Morgan C., Kaczmarek D.: PHP5 and MySQL bible, Wiley Publishing, Inc., Indianapolis, 2004.
- Bartholomew D.: MariaDB and MySQL Common Table Expressions and Window Functions Revealed, Apress, Berkeley, 2017

c. Internet sources:

- https://docs.microsoft.com/en-us/sql/ssms/, Microsoft SQL Server Management Studio documentation
- https://docs.microsoft.com/en-us/sql/, Microsoft SQL documentation

13. Available educational materials divided into forms of class activities (Author's compilation of didactic materi-als, e-learning materials, etc.)

14. Teachers implementing particular forms of education:

Form of education	Name and surname
1. Lecture	
2. Laboratory classes	Bartoszak Rafał, mgr inż.
3. Training	
4. Project classes	
5. Workshop classes	
6. Simulation game	
7. Language classes	