Subject programme

1. Subject name / subject module: **Advanced 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**
   - Field 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				27	36	2,5																2
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	27
Preparation to laboratory classes	15
Independent study of the subject	19
Participation in an exam / graded assignment	2
Total student workload (TSW)	63
ECTS credits	2,5
* Student's workload related to trainings	63
Student's workload in classes requiring direct participation of academic teachers	27

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	**Student has an advanced knowledge of the architecture of database systems, modeling and SQL, necessary for database design. Student has knowledge of tools and techniques related to database management and security.**	**Laboratory work**	**Inquiry methods**	**Student learning activities.**
K_W10	**Student understands at an advanced level the database managmenet systems, database administration tools and techniques and selected topics on security of databases.**			
Skills				
K_U02	**Student has advanced knowledge of data processing with the SQL language, database server management, creating database objects, stored procedures and knowledge of data processing in mechatronics professional environment.**	**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 (3,5,4,4)	4.0
Final result			4.0
Grade		4.0/5 = 80%	**db (4.0)**

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

(Laboratory work)

1. 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;

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

3. Defining domain and semantic integrity constraints;

4. Description of database structure by means of data dictionary

5. 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 structures, operations on the indexes;

6. 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:

- McQuillan M.: Introducing SQL Server, Apress, Berkeley, 2015.
- Brimhall J., Gennick J., Sheffield W.: SQL Server T-SQL Recipes, Apress, Berkeley, 2015.
- Walters R., Fritchey G.: Beginning SQL Server 2012 Administration, Apress, Berkeley, 2012.

b. Supplementary literature:

- Dewson R.: Beginning SQL Server for Developers, Apress, Berkeley, 2015.
- Bell C.: MySQL for the Internet of Things, Apress, Berkeley, 2016.
- Foster E. C., Godbole S.: Database Systems, Apress, Berkeley, 2016.

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 materials, 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	