Data Engineering

Course description

Basic Information

Field of study : Analytical Computer Science

Path : -

Organizational unit : Faculty of Mathematics and Computer Science

Education level : first-cycle

Form of studies : full-time studies

Study profile : general academic

Required : mandatory

Education cycle : 2022/23

Course code : UJ.WMIIANS.120.03338.22

Languages : Polish

Disciplines : Computer Science

ISCED Classification : 0612 Database and network design and administration

USOS Code : WMI.TCS.ID.OL

Course coordinator

Katarzyna Grygiel

Course instructor

Katarzyna Grygiel

Period Semester 2	Form of verification of learning outcomes exam	ECTS credits 6.0
	Course format and hours lecture: 30 laboratory classes: 30	

Learning outcomes for the course

Code	Outcomes in the area of:	Directional learning outcomes	Verification methods

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Knowledge – Student knows and understands:			
W1	- relational data model - structured query language SQL - architecture of modern relational database systems - characteristics, purpose and mechanisms of concurrent transaction execution - mechanisms for failure prevention and recovering databases in case of failure - techniques for modeling conceptual schemas (entity model) - normalization methods in the relational data model - purpose and goal of using data warehouses	IAN_K1_W03, IAN_K1_W07, IAN_K1_W08, IAN_K1_W14	written / oral exam
Skills – Student can:			
U1	- use SQL language and related procedural languages - effectively design and implement information systems using databases - secure and maintain database systems	IAN_K1_U03, IAN_K1_U04, IAN_K1_U11, IAN_K1_U12, IAN_K1_U13, IAN_K1_U14, IAN_K1_U16, IAN_K1_U17, IAN_K1_U18, IAN_K1_U19, IAN_K1_U21	project, credit, written / oral exam
Social competences – Student is ready to:			
K1	- cooperate on modeling, implementing and maintaining information systems - critically analyze the design and applied security measures of information systems	IAN_K1_K01, IAN_K1_K02	project, credit, written / oral exam

ECTS credit balance

Student's activity form	Average number of hours* allocated to completed activity types

lecture	30
laboratory classes	30
independently solving computer problems	60
project preparation	60

Total student workload	Hours 180	ECTS 6.0

* hour (lesson) means 45 minutes

Course content

No.	Course content	Learning outcomes for the course
1.	1. Characteristics of relational databases. 2. Modeling conceptual schemas and implementation schemas in the relational model. 3. Entity relationship model and its transformation to the relational model. 4. Data organization in modern database systems. 5. Characteristics, purpose and techniques of concurrent transaction execution. 6. Database recovery methods after failure. 7. Normalization of relational databases. 8. Structured Query Language SQL. 9. Query optimization. 10. Data warehouses, Big Data and noSQL.	W1, U1, K1

Extended information

Teaching methods:

project method, multimedia lecture, discussion, case studies, problem solving, laboratory classes, consultations

Class type	Assessment forms	Course completion conditions
lecture	written / oral exam	Positive grade from the exam preceded by admission based on a positive grade from exercises/laboratory
laboratory classes	project, credit	Solving independent programming tasks as well as implementation of a team project.

Prerequisites and additional requirements

Formal Methods in Computer Science: - set theory with particular emphasis on the concept of relations Programming Basics: - simple algorithms using basic data structures - basic programming skills in C++ language - basic concepts of computational complexity

Literature

Required

1. J.D. Ullman, J. Widom, Podstawowy wykład z systemów baz danych, WNT, W-wa, 2000 (seria: Klasyka Informatyki)

Additional

1. J. Celko, SQL zaawansowane techniki programowania, Mikom, 1999
2. M. Kleppmann, Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems, O'Reilly Media, 2017

Literature

Required

1. J.D. Ullman, J. Widom, Podstawowy wykład z systemów baz danych, WNT, W-wa, 2000 (seria: Klasyka Informatyki)