(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: DATA WAREHOUSING AND DATA MINING SYSTEMS	**2. Course code MK_40**
3. Validity of course description: 2018/2019	
4. Level of studies: 1st cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study: COMPUTER SCIENCE	(FACULTY SYMBOL) RAU
7. Profile of studies:	
8. Programme: Data Bases and Computer Systems	
9. Semester: 6	
10. Faculty teaching the course: Institute of Informatics	
11. Course instructor: dr hab. inż. Marcin Gorawski, prof. nzw. w Pol. Śl.	
12. Course classification:	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: Student has basic knowledge of the fundamentals of databases, programming (in one of the popular programming languages, such as C ++ or Java), and algorithmics.	
16. Course objectives: The purpose of the DWDMS lecture is to provide students with basic knowledge in the field of concepts, models and design of classical data warehouse systems. The aim of the DWDMS project is acquisition of skills of designing a data warehouse in various environments, with particular emphasis on the "ITA-102 - data warehouses" specialist course methodology. Thanks to the participation in the lecture and project, students verify in practice the ability of designing classic data warehouses, as well as using various data mining methods.	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Student knows the ideas, concepts and models of classic data warehouses and data mining systems	PS/SP	WM	K1A_W09, K1A_W10, K1A_W16, K1A_U18
2.	Student understands the concept of the data extraction process model and its reproduction and has basic knowledge of classical methods of extraction and data integration in real time	PS/SP	WM	K1A_W15 K1A_U01
3.	Student has basic knowledge of modeling data schemes oriented to analytical processing in online mode and knows the methodologies of ROLAP architecture design, including the optimization of physical models	PS/SP	WM	K1A_W14, K1A_U01, K1A_U15, K1A_K01
4.	Student is able to design and implement a data extraction system, model data schemes, build physical models of OLAP, as well as is able to design and implement a classic data warehouse system including ROLAP servers	RP	P	K1A_U21, K1A_U27, K1A_U29

18. Teaching modes and hours

Lecture / Project

Sem 6 - 30 h, Sem 6 - 30 h

19. Syllabus description:

Semester 6:

Lecture:

The genesis of a data warehouse (DW) and data mining systems (DMS). Data extraction processes (ETL / M / R process, design and graphic modeling of data extraction, specialized and universal ETL systems). Data recovery and updating (the fall of ETL processes, traditional resumption algorithms, Design-Resume

(DR / JavaBeans) algorithms and their complexity and cost-effectiveness). Real-time data extraction and integration (ETL development systems, staging technology, hybrid resumption). Data modeling and analytical processing (relational and multidimensional model, on-line analytical processing models (OLAP), multidimensional data operations and schemes, OLAP classes and architectures - comparative analysis). Relational OLAP architecture (ROLAP) design (conceptual, logical model , ERD diagrams, star and snowflake diagrams, complex hierarchies, features, dimensional variability, data aggregation). ROLAP class design methodology of DSS (pilot installations, multi-layered technical infrastructure, selected aspects of DSS in the analysis: 1) cigarette market, 2) AEG manufacturer's market, 3) HR / DSS resources in the power plant). The physical model of ROLAP architecture (bitmap and join indexes, DW Oracle 10g / 11g indexing methods, UB tree, R-tree, data partitioning). Materialized views in the ROLAP architecture (SQL GROUP BY clause, view management, optimization of the physical model). Parallel processing of ROLAP architectures (type: SE, SN, SD, Beowulf cluster, ROLAP / SN architecture striping, performance analysis). Comparative analysis of OLAP market development systems. Data security in ROLAP architecture (user and data authentication, data transfer security, data access control, evaluation of the impact of access control mechanisms and data security on DW performance). ROLAP servers (database versioning, Red Brick Decision Server, DW Oracle, ETL engine, OLAP engine, index management, query optimization, development environment, data mining engine, visualization engine). Directions of data warehouse development.

Lecture:
The aim of the project is to prepare students for the implementation of engineering projects related to classical data warehouses and data mining systems and to present detailed basic knowledge of their engineering. The project consists of 2 parts: specialist course "Data warehouses" (as part of the Microsoft IT Academy program for academic teachers according to the book "ITA-102 - data warehouses") and selected team projects – a list of projects to choose from.

20. Examination: --

21. Primary sources:

Publications of the Team of Theory of Data and Algorithm Spaces in the Studia Informatica journal (http://www.znsi.aei.polsl.pl/). Specialized course "Data warehouses" as part of the Microsoft IT Academy program for academic teachers according to the book entitled "ITA-102 - data warehouses" by: Gorawski M., Gorawski M.J., Bańkowski. S. Publisher: Microsoft IT Academy Publication, 2008, p. 198.

22. Secondary sources:

Research literature, scientific publications, technical reports made available during classes - articles published in conference materials VLDB, DEXA, SIGMOD, ICDE, ADBIS, ADVIS and in the journals of Lecture Notes in Computer Science and IEEE Computer Society.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30 / 5
2	Classes	-- / --
3	Laboratory	-- / --
4	Project	30 / 30
5	BA/ MA Seminar	-- / --
6	Other	-- / --
	Total number of hours	60 / 35

24. Total hours: 95

25. Number of ECTS credits: 3

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 2

26. Comments: --

Approved:

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(date, Instructor's signature) (*date , the Director of the Faculty Unit signature)*