Data warehouses - course description

General information

Course name	Data warehouses
Course ID	11.3-WE-INFD-DataWareh-Er
Faculty	Faculty of Engineering and Technical Sciences
Field of study	Computer Science
Education profile	academic
Level of studies	Second-cycle Erasmus programme
Beginning semester	winter term 2021/2022

Course information

Semester	2
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. inż. Wiesław Miczulski, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Laboratory	30	2	-	-	Credit with grade

Aim of the course

- acquaint students with architectures of data warehouses and multidimensional data models,
- acquaint students with the basic methods of data mining,
- shaping basic skills in the practical construction of the data warehouse.

Prerequisites

Databases, Elements of artificial intelligence.

Scope

Introduction. Decision support systems. Operational processing versus analytical processing.

Data warehouses. Definition of Data Warehouse. Features of Data Warehouse. Exemplary applications. Architectures of Data Warehouses. Layered structure of the Warehouse: data sources, extraction layer, cleaning, transformation and data loading, data access layer. Tools for designing, building, maintaining and administering of the Data Warehouse.

Multidimensional data models. Models: MOLAP, ROLAP, HOLAP. Building of exemplary data cube.

Knowledge representation forms: logical rules, decision trees, neural nets.

Data Mining. Data preparation process. Selected Data Mining methods: classification, grouping, discovering association and sequences, analysis of time series.

Exemplary Data Mining applications.

Teaching methods

- Lecture: conventional/traditional lecture with elements of discussion.
- laboratory: work in the groups, practical excersises.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Applies selected informatics tools in data exploration		• an observation and evaluation of activities during the classes • an observation and evaluation of the student's practical skills • carrying out laboratory reports	• Laboratory
Can characterize data models used in data warehouses		• an exam - oral, descriptive, test and other	• Lecture
Can indicate in the life cycle of a data warehouse the activities leading to the improvement of its quality		• an exam - oral, descriptive, test and other	• Lecture
Can work individually and in a team		• an observation and evaluation of activities during the classes	• Laboratory

Outcome description	Outcome symbols	Methods of verification	The class form
Creates example data warehouses		• an observation and evaluation of activities during the classes • an observation and evaluation of the student's practical skills • carrying out laboratory reports	• Laboratory
Describes the structure of data warehouse		• an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Lecture – obtaining a positive grade from exam.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Calculation of the final grade: lecture 50% + laboratory 50%

Recommended reading

1. Hand D., Mannila H., Smyth P.: *Principles of Data Mining*. Massachusetts Institute of Technology, 2001.
2. Jarke M., Lenzerini M., Vassiliou Y., Vassiliadis P.: *Fundamentals of Data Warehouses*. Springer-Verlag, Berlin, 2002.
3. Larose D.T.: *Discovering Knowledge in Data. An Introduction to Data Mining.* John Wiley & Sonc, Inc., 2005.
4. Larose D.T.: *Data Mining Methods and Models.* John Wiley & Sonc, Inc., 2006.
5. Rutkowski L.: Computational Intelligence. Methods and Techniques. Springer-Verlag, Berlin, 2008.

Further reading

1. Poe V., Klauer P., Brobst S.: *Building a Data Warehouse for Decision Support.* Prentice-Hall, Inc., a Simon & Schuster Company, 1999.
2. Miczulski W., Szulim R.:Using time series approximation methods in the modelling of industrial objects and processes. Measurements models systems and design / ed. by J. Korbicz .- Warszawa : Wydawnictwo Komunikacji i Łączności, 2007 - s. 157--174.
3. Miczulski W., Sobolewski Ł.: Algorithm for Predicting [UTC–UTC(k)] by Means of Neural Networks, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, 8/2017, s. 2136 - 2142.

Notes

Modified by dr hab. inż. Wiesław Miczulski, prof. UZ (last modification: 14-07-2021 18:41)