# Data warehouses - course description

## General information

| | |
|---|---|
| Course name | Data warehouses |
| Course ID | 11.3-WE-INFD-DataWareh-Er |
| Faculty | Faculty of Computer Science, Electrical Engineering and Automatics |
| 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 |
|---|---|---|---|
| Describes the structure of data warehouse | | • an exam - oral, descriptive, test and other | • Lecture |
| Can characterize data models used in data warehouses | | • 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 |
| Applies selected informatics tools in data exploration | | • an observation and evaluation of activities during the classes<br>• an observation and evaluation of the student's practical skills<br>• carrying out laboratory reports | • Laboratory |

| Outcome description | Outcome symbols | Methods of verification | The class form |
|---|---|---|---|
| Creates example data warehouses | | • an observation and evaluation of activities during the classes<br>• an observation and evaluation of the student's practical skills<br>• carrying out laboratory reports | • Laboratory |
| 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 |

## 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)