COURSE DESCRIPTION

1. Information about the programme

1.1 Institution of higher education	**„Alexandru Ioan Cuza” University of Iasi**
1.2 Faculty	**Faculty of Economics and Business Administration**
1.3 Department	**Department of Accounting, Business Information Systems and Statistics (Departamentul de Contabilitate, Informatică economică şi Statistică)**
1.4 Field of study	**Business Information Systems (Informatică economică)**
1.5 Level	**Master**
1.6 Study programme/ Qualification	**Software Development and Business Information Systems/Master (Dezvoltare software şi sisteme informatice de afaceri/Master)**

2. Information about the course

2.1 Course name			**Data Warehouses, Data Mining and Knowledge Discovery**				
2.2 Course coordinator 2.3 Lab coordinator			**Associate Professor Daniel HOMOCIANU, PhD Habil.**				
2.4 Year of study	I	2.5 Semester	II	2.6 Type of assessment	**Ongoing assessment + Exam**	2.7 Discipline status	**E**

* *C – Compulsory / E - Elective*

3. Total estimated time (hours alloted to didactic activity per semester)

3.1 Total number of hours per week	3	of which: 3.2 lecture	2	3.3 seminar/lab	1
3.4 Total number of hours in the curriculum	42	of which: 3.5 lecture	28	3.6 seminar/lab	14

Time distribution	Hours
Study of the handbook, coursebook, bibliography and notes	32
Additional research in the library, online and on the field	15
Preparation of own practical project lab modules or lecture presentations	32
Tutorials	15
Assessment	14
Other activities.....	-

3.7 Total number of self-study hours	108
3.9 Total number of hours per semester	150
3. 10 Number of credits	6

4. Prerequisites (if applicable)

4.1 curriculum-based	• Databases (or similar)
4.2 competence-based	• Not applicable

5. Conditions (if applicable)

5.1. for lectures	• Internet access, Video projector, Physical attendance (at least when presenting)
5.2. for seminars/labs	• Physical attendance (at least when presenting), Oracle Virtual Box & the virtual machines at: https://tinyurl.com/2s3rf6m9 or https://tinyurl.com/4sbdufyb

6. Assimilated specific competences

Professional competences	C4 Competence to integrate data, components and services in business systems and applications C4.1 Gaining detailed knowledge on all aspects of methodological and technological regarding the representation and persistence of data formats, the protocols and means of communication and integration of applications and services within distributed business information systems (1 credit) C4.2 Identification of technically and economically feasible solutions for data, applica-tions and services integration using existing methodologies and tools (1 credit) C5 Competence to manage IT projects and provide IT services C5.4 Development of decision and analysis models to be applied in the dynamic IT environment (2 credits) C6 Competence to manage and develop business processes using IT C6.2 Identification and orchestration of information processes in business using BPM (Business Process Management) tools (1 credit)
Transversal competences	CT1 – The ability to communicate and collaborate in teams of different professionals (0.5 credits) Continuous improvement of specific skills and knowledge towards approaching information systems CT3 – Continuous improvement of specific skills and knowledge towards approaching information systems, development of new software technologies and management of information systems (0.5 credits)

7. Discipline objectives (provided by the assimilated specific competences grid)

7.1 The general objective of the discipline	• To provide the knowledge of Data Warehouse (**DWH**) technologies in order to efficiently implement them in organizations , including programmatic operation.
7.2 Specific objectives	• Basic knowldge of multidimensional data models and implementation methodologies • Knowledge of main DWH products • Ability to design and implement DWHs & Data Mining (**DM**) models • Basic Knowledge of exploiting DWH technologies in organizations

8. Content

8. 1 **COURSE / LECTURE**	Teaching methods	Observations
Introduction to the DWH discipline including the presentation of requirements and planning those at least 12 specific students' presentations (20%) of the master students teams about: 1.retail sales, 2.inventory, 3.procurement, 4.order management, 5.accounting, 6.CRM, 7.HRM, 8.financial services, 9.telecommunications, 10.transportation, 11.education, 12.healthcare, 13.e-commerce, 14.insurance (20% in the final grade. Details: tinyurl.com/jogo5uy (Kimball&Ross), or (for other topics) at: https://tinyurl.com/bddtc9u8	PPT presentations, examples , explanations, conversations	1 lecture (2 hours)
Brief history Data Architecture + time for 2 specific theoretical presentations		2 lectures (4 hours)
Dimensional Modeling + time for 2 specific theoretical students' presentations		2 lectures (4 hours)

Technical Architecture Considerations + time for 2 specific theoretical students' presentations	and questioning	2 lectures (4 hours)
Extract Transform Load and Data Quality + time for 2 specific theoretical students' presentations		2 lectures (4 hours)
DWH, Data Mining and Predictive Modeling + time for 2 specific theoretical students' presentations		2 lectures (4 hours)
DWH Lifecycle **Trends in the evolution of DWH: Extended RDBMS Architecture**, **Pushing into the Future**, **DWH 1.0 vs. 2.0** + time for 2 specific theoretical students' presentations		2 lectures (4 hours)
Presenting and discussing the possible topics of the theoretical evaluation + time for 2 specific theoretical students' presentations		1 lecture (2 hours)

Bibliography:

Airinei, D., Depozite de date, Polirom, Iaşi
Inmon,W.H.,Linstedt, D., Data Architecture:A primer for the data scientist, MK, MA (tinyurl.com/h7dcq66)
Kimball, R., Ross, M., The Data Warehouse Toolkit Third Edition. The Definitive Guide to Dimensional Modeling, John Wiley & Sons, New York (tinyurl.com/jogo5uy)
Kimball, R., Ross, M., The Kimball Group Reader. Relentlessly Practical Tools for Data Warehousing and Business Intelligence – Remastered Collection, Second Edition, Wiley, New York (tinyurl.com/johox4v)
Krishnan, K, Data Warehousing in The Age of Big Data, Morgan Kaufmann (MK), MA (tinyurl.com/zrjo75j)
Reeves, L.L., A Manager's Guide to Data Warehousing, Wiley, New York (tinyurl.com/htsslk8)
Wang, J., Encyclopedia of Data Warehousing and Mining, (https://tinyurl.com/4jkfexpj)
Bhatia, P., Data Mining and Data Warehousing. Principles and Practical Techniques (https://tinyurl.com/3zw8362v)
OTHER RESOURCES AT: https://tinyurl.com/bddtc9u8

8. 2 **LAB / SEMINAR**	Teaching methods	Observations
Creating a DWH project comparatively by using Microsoft SQL Server Analysis Services / SSAS (2 members project module to assess in the last week : original examples starting from different types of databases, at least 2 cubes, 4 dimensions, 4 corresponding hierarchies and 4 measures with different aggregation functions using SSAS)	demonstration, tutorials, questioning	1 lab (project module presentation required in the last lab – 6.66% in the final grade)
Creating SSAS MDX (MultiDimensional eXtension) queries to get data from a multidim. DWH cube (2 members project module to assess in the last week: original examples with at least 6 queries)	demonstration, query execution, questioning	1 lab (project module presentation required in the last lab – 6.66% in the final grade)
Using ADOMD (ActiveX Data Object MultiDimensional) objects to connect to a DWH cube in Microsoft Visual Studio .NET 2013 (2 members project module to assess in the last week: original examples with at least 2 forms including charts, grids and interactive controls for customizing at least one generic support MDX query for each form)	demonstration, code execution, questioning	1 lab (project module presentation required in the last lab – 6.66% in the final grade)
Creating Data Mining (DM) models starting from DWH cubes / relational data sources / tables by using comparatively MS SSAS and/or the Data Mining add-in and further verifying them by using other tools (R, Python, STATA, e.g. tinyurl.com/4szxde6v (2 members project module to assess in the last week: original examples with at least 4 models based on different techniques)	demonstration, tutorials, questioning	1 lab (project module presentation required in the last lab – 6.66% in the final grade)
Creating SSAS DMX (DataMining eXtension) queries in relation to the DM models previously defined (2 members project module to	demonstration, query	1 lab (project module presentation

assess in the last week: original examples with at least 6 queries, 1/2 per model)	execution, questioning	required in the last lab – 6.66% in the final grade)
Using ADOMD objects to connect to DM models in Microsoft Visual Studio .NET 2013 (2 members project module to assess in the last week: original examples with at least 2 forms including charts, grids and interactive controls for customizing at least one generic support DMX query for each from)	demonstration, code execution, questioning	1 lab (project module presentation required in the last lab – 6.66% in the final grade)
Face-to-face presentation and assessment of the 6-module practical project (this last lab)	presentation, demonstration, code execution, questioning, assesment	1 lab (presentation and assesment of all practical modules: 6 * 6.66% = 40%)

Bibliography:

Airinei, D., Dopspinescu, O., Huiban, A., Aplicatii practice cu sisteme OLAP si Depozite de date, Editura Sedcom Libris, Iaşi,
Sarka, D., et. al., Implementing a Data Warehouse with Microsoft SQL Server. Training Kit, O'Reilly Media, Sebastopol (tinyurl.com/jk6lclk)
Sheldon, B., et. al., Professional Visual Basic and .NET Programming, John Wiley & Sons, Indianapolis (tinyurl.com/hrb6j9u)
Homocianu, D., Sistemele de asistare a deciziilor in contextul societatii cunoasterii, (ssrn.com/abstract=2384380),
Editura UAIC, Iasi
https://ukdataservice.ac.uk/app/uploads/20201216censusmicrodataslides.pdf
OTHER RESOURCES AT: https://tinyurl.com/bddtc9u8

9. Corroboration of the discipline content with the expectations of epistemic community representatives, professional associations as well as of representative employers in the programme related field.

The content of this discipline has been decided upon by taking into account both the curricula of some prestigious Western Universities and the demands of the economic environment provided by potential employers, either in the public or in the private IT companies.

10. Assessment

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade
Practical ongoing evaluation regarding the development of support components for a DWH based app.prototype	real-world application, complexity, validity and originality	Face-to-face presentation (the last lab/week) of the practical project with 6 modules (details at section 8.2, pp.3) about: the design of DWHcubes & DM models implemented, corresponding MDX & DMX queries and app.prototypes (e.g. .NET forms bound to multidim.cubes &mining models). Both queries & apps' sources and presentations should be available at the moment of presentation.	40% (6 * 6.66%)
Theoretical evaluation of presentations during lecture hours (14 themes on domains, section 8.1, pp.2)	format, validity of sources, consistent pro-or-cons arguments, controversial theme and originality of comments and conclusions	Theoretical presentations (.ppt/.pptx/.pdf) delivered in real-time (presented and debated during lecture hours) and previously sent at *daniel.homocianu@uaic.ro*	20%

Theoretical exam based on answers to questions	solid theoretical knowledge of DWH applied in real-world scenarios	Final theoretical evaluation starting from at least 30 questions (survey/quiz)	40%

10.6 Minimum performance standard

- Design and implement DWH cubes, Data Mining models and corresponding application prototypes with dynamic and interactive user interface components to programmatically query them (MDX and DMX queries);
- **The resulting average of those six (6) scores of the face-to-face presentation of lab modules** (section 8.2, pp.3) **should be at least five (5)**.
- **The grade for the theoretical exam (survey/quiz) must be at least five (5)**.
- **The final grade must be at least five (5)**.

Date of completion
09/13/2023
Date of aproval within the department
09/27/2023

Course and lab coordinator,
Assoc. Prof. Daniel HOMOCIANU, PhD Habil.

Head of the CIES Department,
Prof. Mircea ASANDULUI, PhD