<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Multidimensional information systems</td></tr>
<tr><td>Code</td><td>EUB405</td><td>Year of study</td><td colspan="4">II</td></tr>
<tr><td>Course teacher</td><td>Full Professor Maja Ćukušić, PhD
Full Professor Mario Jadrić, PhD</td><td>Credits (ECTS)</td><td colspan="4">5 ECTS</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Assist. prof. Ivana Ninčević Pašalić, PhD</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>26</td><td></td><td>26</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4">40%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">• Get a comprehensive understanding of the concepts and solutions for data storage and business data analysis.
• Develop the ability to use tool(s) for the entire process of data warehousing and data processing (from data modeling and ETL, to presentation & visualization of data to end users using OLAP reports).</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Understanding of basic concepts of relational databases.
Basic knowledge of MS Office Access.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">Devise the process of business data analytical processing using multidimensional information systems.

1. Re-examine the importance of data warehouse and OLAP systems for business analysis.
2. Compare relational and multidimensional data model.
3. Develop an appropriate multidimensional data model for a specific business problem.
4. Develop ETL process for a specific business problem.
5. Present business data using interactive OLAP analyzes and reports.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">
<table>
<tr><th rowspan="2">Week</th><th colspan="2">Lectures:</th><th colspan="2">Exercises:</th></tr>
<tr><th>Topic</th><th>Hours</th><th>Topic</th><th>Hours</th></tr>
<tr><td>1</td><td>Concept of data warehouses and OLAP systems. Data warehouse as a prerequisite for business analytics.</td><td>2</td><td>ERP systems and reporting. Microsoft Dynamics NAV, the system and its functions. Introduction to OLAP component.</td><td>2</td></tr>
<tr><td>2</td><td>Elements of the multidimensional data model. Basic operations in the dimensional model.</td><td>2</td><td>Assignment. Data Acquisition & Source Connectivity in Power BI Desktop..</td><td>2</td></tr>
<tr><td>3</td><td>Characteristics of OLAP systems. Business requirements for OLAP systems.</td><td>2</td><td>Assignment. Data Profiling, Cleaning, and Transformation with Power Query.</td><td>2</td></tr>
<tr><td>4</td><td>Logical and physical requirements for OLAP systems. OLAP system functionalities.</td><td>2</td><td>Assignment. Semantic Model Design: Relationships, Properties, Hierarchies, and Parameters.</td><td>2</td></tr>
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	5	Multidimensional data models and dimensions. Star and snowflake data structures.	2	Assignment. DAX Fundamentals: Writing Formulas, Measures, and Core Calculations.	2
	6	Data types in data warehouses. Types and structure of dimensions. Dimension representation.	2	Assignment. DAX Advanced Calculations: Context Transition and Filter Modification.	2
	7	Data modeling, hierarchies, and transactions.	2	Assignment. Time Intelligence in DAX: Date Tables and Period Comparisons.	2
	8	Test			
	9	Data extraction and transformation. Data sources. Ensuring data quality. Data integration and consolidation. Master data management.	2	Assignment. Effective Report Building: From Requirements to UX (Layout, Interactions, Accessibility).	2
	10	Data warehouse development. Data warehouse architecture..	2	Assignment. Advanced Analytics & Visual Calculations in Power BI Reports..	2
	11	Configuring and loading the data warehouse.	2	Assignment. Power BI Service Operations: Workspaces, Semantic Model Management, Dashboards, Distribution.	2
	12	Using multidimensional formulas and expressions.	2	Assignment. Generative AI on Azure: prompt engineering, Retrieval-Augmented Generation (RAG), safety controls, and output evaluation	2
	13	Presenting data to end users (SQL queries and reports, interactive OLAP reports, data mining reports).	2	Assignment. End-to-end solutions for unstructured data on Azure: integrating Language, Speech, Computer Vision, and Information Extraction	2
	14	Visualization of multidimensional data. Dashboard data visualization. Examples of multidimensional data models. Review or Guest lecture..	2	Presentation of selected seminar papers (advanced OLAP technologies): the list of seminar topics is available for selection on the Moodle system. Presentation of selected final projects (application of knowledge using an example of a selected organization): the structure is specified in detail, and examples are available on the Moodle system..	2
	15	Test			

Format of instruction	x lectures x seminars and workshops x exercises ☐ *on line* in entirety x partial e-learning ☐ field work	x independent assignments x multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The course work can be described as a method of continuous student progress evaluation since a model of accumulation of points has been formulated which enables the student to collect points through various activities. The goal is that every student collects sufficient number of points corresponding to a grade during the semester. In this model, a low result in one activity can be compensated by points in other activities and enabling students to decide how to allocate their efforts. Requirement for taking the test: 4 out of 7 assignments completed for the first test, and 4 out of 6 for the second test. Requirements for the exam are completed final assignment and case study as well as participating in at least 50% of all class meetings (25% for the part-time students). Classes are organized in blocks (lecture blocks and exercise/lab blocks), which are defined in the schedule plan at the beginning of the semester.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	1,7 ECTS	Research		Practical training	
	Experimental work		Report		Tests (Other)	
	Essay	0,5 ECTS	Seminar essay	1 ECTS	Final assignment (Other)	1 ECTS
	Tests	1,6 ECTS	Oral exam		Workshop attendance (Other)	0,2 ECTS
	Written exam		Project	1 ECTS	(Other)	

Grading and evaluating student work in class and at the final exam	Requirements for the exam exemption: a total of 71 points achieved overall based on the tests, assignments, and homework during the semester. Through additional engagement and active participation (for example by submitting critical review of the book chapters and coursework), the student can get up to 14 bonus points. In the case of exam exemption, the score is based on the total number of points where every five points give a higher grade. Up to 10 points can be achieved in the oral part of the exam. Threshold and related grades: 0-70 insufficient (1) 71-75 sufficient (2) 76-80 good (3) 81-85 very good (4) 86-100 excellent (5) If a student does not have enough points from the assessment activities during the semester, he or she is required to take the final exam. The final exam can be organized in a written and/or oral way. The questions in the exam are of the essay-type.

Required literature (available in the	**Title**	**Number of copies in the library**	**Availability via other media**

library and via other media)	Garača, Ž. & Ćukušić, M. (Eds.) (2011) *Višedimenzijski informacijski sustavi: Skladištenje i analitička obrada podataka.* Split, Ekonomski fakultet u Splitu.		Available online (from the institutional repository and via Moodle LMS)
	Richardson, J. et al. (2021) *Magic Quadrant for Analytics and Business Intelligence Platforms*, Gartner.		Available online (via Moodle LMS)
	https://learn.microsoft.com/training/modules/configure-semantic-model-power-bi		Free access from Microsoft.com
	https://learn.microsoft.com/en-us/training/modules/get-started-ai-fundamentals		Free access from Microsoft.com
Optional literature (at the time of submission of study programme proposal)	Stephen Few (2021) Now You See It: An Introduction to Visual Data Sensemaking, Second Edition, Analytics Press. Papers: • Mijač, Tea; Jadrić, Mario; Ćukušić, Maja: The Potential and Issues in Data-Driven Development of Web Personas // mipro proceedings / Skala, Karolj (ur.). Rijeka : Croatian Society for Information and Communication Technology, Electronics and Microelectronics - MIPRO, 2018. 1427-1432. Other publications: • SAS: The future of big data is data management, 2015. (e-book) available in Moodle LMS and other sources (reports, papers, platform analyses) published in the e-course.		
Quality assurance methods that ensure the acquisition of exit competences	• Monitoring attendance and performance of other student obligations (teacher) • Teaching Supervision (Vicedean for Education and student affairs) • Analysis of the success of studies in all subject studies (Vicedean for Education and student affairs) • Student Survey on the Quality of Teachers and Teaching for Each Subject Study (UNIST, Center for Quality Improvement) • The exam conducted by the subject teacher examines all learning outcomes of the subject. Periodic examination of the content of the exam is conducted on the basis of which the appropriateness of the method of checking the learning outcomes (Vicedean for Education and student affairs)		
Other (as the proposer wishes to add)			