



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
DATA MINING TECHNOLOGIES	

Academic staff	Core academic unit(s)
Coordinating: jun. assist. Paulius Danielius	Kaunas Faculty Institute of Language, Literature and Translation Studies <input type="checkbox"/> Institute of Social Sciences and Applied Informatics <input checked="" type="checkbox"/>

Study cycle	Type of the course unit
First <input checked="" type="checkbox"/> Second <input type="checkbox"/>	Compulsory Course <input checked="" type="checkbox"/> Optional Course <input type="checkbox"/> Course Unit (Module) of the General University Studies <input type="checkbox"/> Course Unit (Module) of Individual Studies <input checked="" type="checkbox"/> Interdisciplinary Studies Course Unit (Module) <input type="checkbox"/>

Mode of delivery	Semester or period when it is delivered	Language of instruction
Auditorium	2 nd semester	English

Requisites	
Prerequisites: Advanced Mathematics, Informatics	Co-requisites (if relevant):

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	130	52	78

Purpose of the course unit
To develop the ability to work with data mining and data analysis technologies. To provide students with an understanding of data mining technologies, data analysis technologies, trends, methods. To develop the ability to apply in practice the main data analysis tools and the methods and algorithms used in them. Develop the ability to process, interpret and analyze data mining results.

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
Will be able to communicate effectively in written and oral English and/or national languages, using appropriate subject-specific terminology, presenting proposed ideas and justifying innovative solutions to problems to an audience of both professionals and users of IT services.	Active learning methods (individual presentation and group discussion).	Presentation of an individual written work to the class.
Will be able to apply knowledge of informatics engineering to develop safe and secure informatics application solutions that meet other relevant criteria for solving societally relevant problems.	Lectures, case studies, practical tasks.	<ul style="list-style-type: none"> • Defense of practical tasks reports. • Colloquium: Test in e-learning system. • Examination
Will be able to carry out a skilled analysis of a problem in the subject area of informatics engineering, using relevant and well-chosen	Lectures, practical tasks, Active learning methods (group discussion, comparative analysis of methods).	

empirical data, adhering to theoretical approaches, and applying effective methods.	
Will be able to systematize, summarize, interpret and critically evaluate research results, formulate conclusions and make recommendations for practical application.	Practical tasks, case studies.

Content	Contact hours							Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	Contact hours, total	Individual work	Tasks for individual work
1. Introduction to Data Mining.									Practical tasks.
Purpose, tasks, scope, applications and challenges of data mining. Modern data sources. Knowledge discovery – from data to decision.	2						2	6	Individual assignment - written work (scientific review on a topic chosen from a list of data mining applications in different subject areas), analysis and synthesis of the scientific literature.
Data mining lifecycle and process models. CRISP-DM and other processes.	2				2		4	8	
The nature of data. Data preparation and preprocessing.	2						2	6	
Business Intelligence systems.	1						1		
Data mining tools, Rapid Miner (AI Studio) software package. Data visualization.	1				2		3	4	Presentation of the written work.
2. Data repositories.									Preparing for the colloquium.
Data warehousing systems, technologies and architectures.	2						2	4	
Colloquium							2		
3. Data mining algorithms and techniques.									Practical tasks.
Decision trees	2				4		6	6	
Association rules.	2				4		6	6	
Text and web mining.	2				4		6	6	
Neural networks.	2				4		6	6	
Other data mining algorithms.	2			2	4		8	6	
Python tools for data mining.				2			2		
Consultation		2					2		
Exam								20	Preparing for the exam.
Total	20	2		4	24		52	78	
Note: up to 4 contact hours may be replaced by guest lectures given by social partners or educational visits to social partner organisations.									

Assessment strategy	Weight %	Deadline	Assessment criteria
Practical assignments	40	2-16 th week	Practical assignments are to be completed throughout the semester, and assignment reports are to be uploaded to the VMA according to the provided requirements and timetable. Each assignment is evaluated on a 10-point scale according to the VU assessment criteria. The overall grade for the practical assignments is the average of the grades for all assignments.
Written work with presentation	10	6 th week	Written work – essay on the selected topic from the list provided by the lecturer: students must prepare a literature review and analysis and give an oral presentation in class. Grading: written assignment 50% + presentation 50%. NO late assignments will be accepted, consequently, a student will be assigned a zero if the work is turned in late without the lecturer's permission.
Colloquium	20	9 th week	The colloquium includes the presented theoretical and practical material, evaluation on a 10-point scale according to VU evaluation criteria.
Exam	30	During the session	The exam covers the presented theoretical and practical material of the subject, evaluation on a 10-point scale according to VU evaluation criteria.

REGARDING THE EXTERNAL EXAMINATION OF THE COURSE UNIT

Mark <input checked="" type="checkbox"/>			If permitted, please provide the conditions
Not permitted	<input type="checkbox"/>	Permitted	<input checked="" type="checkbox"/>
			Practical assignments and individual written assignment with presentation must be submitted to the lecturer via email (or uploaded to the e-learning platform) no later than 5 days before the exam. The same assessment criteria apply as for students taking the regular course.

REGARDING THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (GenAI) TOOLS (SUCH AS "CHATGPT", ETC.) WHEN STUDYING THE COURSE UNIT

Mark <input checked="" type="checkbox"/>			If permitted, please provide the conditions
Not permitted	<input type="checkbox"/>	Permitted	<input checked="" type="checkbox"/>
			<p>GenAI can be used to explore the principles of methods, algorithms, and techniques; to examine sample program code; to generate ideas; and to experiment. Additional instructions, if applicable, are provided in the description of each practical assignment.</p> <p>GenAI may not be used:</p> <ul style="list-style-type: none"> • In written assignments and presentations for copying and pasting text without proper citation, • While taking assessment tests during the semester and the exam. <p>If GenAI is used when preparing a written assignment, the student must describe:</p> <ul style="list-style-type: none"> • The strategy for using GenAI tools, • What questions were asked, • What result was obtained and what percentage of that result was modified and adapted when preparing the paper. <p><i>(The presentation is a supplementary tool; therefore, students seeking the highest grade must present the specified topic in a high-quality manner – reading from slides is graded with a minimum score).</i></p> <p>In all cases, students must adhere to the recommendations and requirements set forth in the Guidelines for the Use of Artificial Intelligence at Vilnius University.</p>

REGARDING ACADEMIC PROGRESS

A student who (1) **throughout the semester consistently** fails to demonstrate **progress in achieving the expected learning outcomes of a subject (module)** during the practical classes (seminars, exercises, laboratory work, etc.) and (2) fails to complete all interim assessment requirements and tasks within the time specified in the course description, is not allowed to participate in the examination session.

Author (-s)	Publishing year	Title	Issue of a periodical or volume of a publication	Publishing house or web link
Required reading				
P. Danielius	2025	Moodle environment		https://emokymai.vu.lt/?lang=en
Mohammed J. Zaki, Wagner Meira	2014	Data mining and analysis: fundamental concepts and algorithms		Cambridge University Press
Ian H. Witten, Eibe Frank, Mark A. Hall	2011	Data mining: practical machine learning tools and techniques		Morgan Kaufmann
G. Dzemyda, O. Kurasova, J. Zilinskas	2013	Multidimensional Data Visualization Methods and Applications		Springer
Recommended reading				
Andreas C. Müller, Sarah Guido	2018	Introduction to machine learning with Python: a guide for data scientists		O'Reilly
Gabe Ignatow, Rada Mihalcea	2018	An introduction to text mining: research design, data collection, and analysis		SAGE