SUBJECT DATASHEET

DATA ANALYTICS

BMEGT20MN49

I. SUBJECT DESCRIPTION

1. SUBJECT DATA

Subject name
DATA ANALYTICS

ID (subject code)	BMEGT20MN49

Type of subject
contact lessons

Course types and lessons

Type	*Lessons*
Lecture	1
Practice	1
Laboratory	0

Type of assessment
term grade

Number of credits
3

Subject Coordinator

Name	*Position*	*Contact details*
Dr. Nemeslaki András	professor	nemeslaki.andras@gtk.bme.hu

Educational organisational unit for the subject
Department of Management and Business Economics

Subject website
https://edu.gtk.bme.hu

Language of the subject
magyar - HU; angol - ENG

Curricular role of the subject, recommended number of terms

Direct prerequisites

Strong	None
Weak	None
Parallel	None
Exclusion	None

Validity of the Subject Description
Approved by the Faculty Board of Economic and Social Science (27.01.2021) with the 4th decision on the 580.006/4/2021 registration number that is valid from 27.01.2021.

2. OBJECTIVES AND LEARNING OUTCOMES

Objectives

The aim of the course is to enable students to identify the business problems in which data analysis or data science methods can be applied and by prototyping them to support and communicate the inherent business advantage. The course introduces students to the theoretical and practical foundations of data analysis methods to inform economic decisions. Another important objective is to discuss the appropriate micro- and macroeconomic applications of data science. The subject provides quantitative knowledge for the analysis and prediction of the studied phenomena. In addition to the transfer of the necessary theoretical knowledge, the subject focuses primarily on the solution of practical tasks, issues of practical application, and the development of a data analysis mindset and approach.

Academic results

Knowledge

1. Knowsthe most important tasks of business data analysis, the areas of expertise and the tools that can be used in them
2. Know the technical details of the steps required for the main tasks of data analysis (data collection, data preparation, modeling, evaluation, application)
3. Know the most important theoretical models and algorithms of data science, the basic paradigms of supervised and unsupervised machine learning.
4. Know the basic tools and methods of data visualization.
5. Are aware of the basic operation of data-driven decision support tools.
6. Know the most important micro- and macroeconomic applications of data science, data analysis and data visualization, especially in the field of business intelligence
7. Know the learning, knowledge acquisition and data collection methods of the fields of data analysis, their ethical limitations and problem-solving techniques.

Skills

1. Are able to identify a business problem to which data science or machine learning solutions can be applied
2. Are able to prototype these possible solutions, visualize their results, and identify business value based on decision making for further analysis.
3. Are able to use the learned theories and methods, explores, systematizes and analyzes facts and basic connections, formulates independent conclusions and critical remarks, makes decision-making proposals, and makes decisions in routine and partly unknown - domestic and international - environments.
4. Are able to determine the complex consequences of economic processes and organizational events.
5. Can apply data analysis problem solving techniques, problem solving methods, their application conditions and limitations.

Attitude

1. Cooperate with the instructor and fellow students in expanding the knowledge.
2. Expand their knowledge by constantly acquiring knowledge.
3. Are open to the use of information technology tools.
4. In the interest of quality work, demonstrate problem-sensitive, proactive behavior, constructive, cooperative, proactive in a project, in case of group tasks.
5. Strive for accurate and mistake-free problem solving.

Independence and responsibility

1. Are suitable for independent work (selection of methodology, technique; organization, planning, management of work; data collection, systematization, analysis, evaluation; general and professional development),
2. Use a systems approach in your thinking.
3. Take responsibility for their analyzes, conclusions and decisions.
4. As a member of projects, group work, organizational units, they perform the tasks assigned to them independently and responsibly.

Teaching methodology

Lectures, computational exercises, written and oral communication, use of IT tools and techniques, optional independent and group work, work organization techniques

Materials supporting learning

- Carlo Vercellis: Business Intelligence : Data Mining and Optimization for Decision Making, 2009 John Wiley & Sons
- Olivia Parr Rud: Data Mining Cookbook: Modeling Data for Marketing, Risk and Customer Relationship Management, Wiley
- Gábor Békés, Gábor Kézdi: Data Analysis: Patterns, Prediction and Causality, Cambridge University Press
- Fogarassyné Vathy Ágnes, Starkné Werner Ágnes: Intelligens adatelemzés. (2011). Typotex Kiadó
- Dr. Kovács László: Adatelemzési technikák és eszközök (2011) Nemzeti Tankönyvkiadó
- Christoph Molnar (2019) Interpretable Machine Learning. Leanpub
- Thomas Dinsmore (2016) Disruptive Analytics: Charting Your Strategy for Next-Generation Business Analytics
- Matthew North (2019) Data Mining for the Masses, Third Edition: With Implementations in RapidMiner and R
- Vijay Kotu (2018) Data Science: Concepts and Practice
- Cole Nussbaumer Knaflic (2015) Storytelling with data

- Edward Tufte (2007) The visual Dispaly of Quantitative Information
- Scott Berinato (2016) Good Charts

II. SUBJECT REQUIREMENTS

TESTING AND ASSESSMENT OF LEARNING PERFORMANCE

General Rules

The evaluation of the learning outcomes outlined in point 2.2. is conducted through a mid-term written performance assessment (summative
academic performance evaluation) and an optional partial performance assessment (active participation).

Performance assessment methods

1. Written end-term test: during the semester, the course material will be tested with a written end-term test. The test consists of theoretical questions and calculations. At least 50% of the points of the mid-term test must be obtained in order to obtaining the signature and pass the course. 2. Project task: After the semester, a project work/task is required to test the acquisition of practical knowledge that requires the use of all relevant topics. Students carry out the analysis of a selected set of data from the identification of the problem to the visualization of the prototyped business value, covering the syllabus, in small student groups individually. The project task documentation includes data, the performed actions, the obtained results, conclusions and visualizations (eg. a dashboard
showing this). End-of-semester assessment is a presentation of this documentation.

Percentage of performance assessments, conducted during the study period, within the rating

Percentage of exam elements within the rating

Conditions for obtaining a signature, validity of the signature

Issuing grades

Excellent	95
Very good	90–94
Good	80–89
Satisfactory	65–79
Pass	50–64
Fail	50

Retake and late completion

1. At least 50% of the points must be achieved for end-term test. The written end-term test can be retaken on week 15th (replacement week). In the event of a retake the test, the result achieved at the replacement enclosure will count towards the final result. Students who do not reach the minimum level of the end-term test after the replacement test may also try to complete the end-term test again during the replacement week, paying a special fee. Thereafter, there is no further opportunity to obtain the signature during the

Coursework required for the completion of the subject

Participation in contact lessons	30
Preparing for the practice lessons	15
Preparing for the test	15
Preparation of the project test	30
total	90

Approval and validity of subject requirements

III. COURSE CURRICULUM

THEMATIC UNITS AND FURTHER DETAILS

Topics covered during the term

Subject includes the topics detailed in the course syllabus to ensure learning outcomes listed under 2.2. to be achieved. The schedule of topics in the course curriculum in each semester may be affected by the calendar and other constraints.

1 Introduction to Data Science: History, Key Concepts, Aims, Job Roles, Tools, Field of Application
2 Data Discovery and Data Preparation
3 Data Visualisation 1
4 Data Visualisation 2
5 Business Intelligence: Use Cases 1
6 Micro- and Macroeconomics Use Cases 1
7 Methods of Supervised Machine Learning 1
8 Methods of Supervised Machine Learning 2
9 What Makes a Good Model??? – Evaluating Models and Automating Machine Learning
10 Methods of Unsupervised Machine Learning
11 Business Intelligence: Use Cases 2
12 Micro- and Macroeconomics Use Cases 2

Additional lecturers

Dr. Hámornik Balázs Péter	egyetemi adjunktus	hamornik@erg.bme.hu
Molontay Roland	tudományos segédmunkatárs	molontay@math.bme.hu
Póra András	egyetemi tanársegéd	pora@finance.bme.hu

Approval and validity of subject requirements

Part I-III of the Subject Form is to be approved by the Head of Department of Economics named under