SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Master
1.6 Program of study/Qualification	Data Science / Master
1.7 Form of education	Full time
1.8 Subject code	14.10

2. Data about the subject

2.1 Subject name	***Data-driven Business and Behaviour Analytics***				
2.2 Course responsible/lecturer	Prof. dr. eng. Adrian Groza - Adrian.Groza@cs.utcluj.ro				
2.3 Teachers in charge of seminars/ laboratory/project	Prof. dr. eng. Adrian Groza - Adrian.Groza@cs.utcluj.ro				
2.4 Year of study	II	2.5 Semester	3	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DD
	DI – Impusă, DOp – opțională, DFac – facultativă				DO

3. Estimated total time

3.1 Number of hours per week	3	of which:	Course	2	Seminars	1	Laboratory	-	Project	-
3.2 Number of hours per semester	42	of which:	Course	28	Seminars	14	Laboratory	-	Project	-
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										20
(b) Supplementary study in the library, online and in the field										20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										10
(d) Tutoring										5
(e) Exams and tests										3
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	58
3.5 Total hours per semester (3.2+3.4)	100
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Time series Analysis
4.2 Competence	programming in Python

5. Requirements (where appropriate)

5.1. For the course	Attending min 50% of the lectures to be admitted to take the final exam
5.2. For the applications	Compulsory attendance of 100% to be admitted to take the final exam

6. Specific competence

6.1 Professional competences	Innovative design of artificial intelligence and computer vision systems and related software and hardware using the specific tools. Contextual integration and exploitation of dedicated information systems.

6.2 Cross competences	Exercising the skill of continuous self-education and demonstrating critical, innovative and research abilities.

7. Discipline objective (as results from the *key competences gained*)

7.1 General objective	The main objective of this discipline is to provide specific information and to prepare students for designing and building solutions based on IOT generated data.
7.2 Specific objectives	To achieve these general objectives, students will learn how to: - analyse data specific to the domain - extract useful knowledge - extract behaviour from IOT data

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction to network science	2	Onsite/ ZOOM	
Different types of social networks	2		
Metrics and communities	2		
Tools for network analysis	2		
Rational and biassed agents	2		
Modelling decision making with agents	2		
Data generated by business, finance, and economics	2		
Data wrangling for human behavior: sources of data	2		
Preliminary analysis and identification of best modelling options	2		
Social media - generator of data	2		
Internet of things - generator of data	2		
Extracting behaviour from connected appliances	2		
Extracting Usage patterns from connected appliances	2		
Working with human-related data: legal implications, best practices, data masking	2		

Bibliography

Barabasi "Network Science" 2016 - Cambridge University Press

Newman "Networks: an introduction" 2nd ed 2018 - Oxford University Press

Tesfatsion, Judd "Handbook of Computational Economics - Vol. 2: Agent Based Computational Economics" 2006 - North-Holland

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Kaggle data sources: cloud processing of network generated data	2	Onsite/ ZOOM	
Describing and Summarizing Data: visualisation tools in Databricks; data distribution models	2		
Visualisation tools for describing network data	2		
Multiple Regression Analysis	2		
Process of IoT data: transformation to time series	2		
Identification of patterns in behavioral data in IoT context	2		
Python tools for behaviour analytics	2		

Bibliography

Barabasi "Network Science" 2016 - Cambridge University Press
Newman "Networks: an introduction" 2nd ed 2018 - Oxford University Press
Tesfatsion, Judd "Handbook of Computational Economics - Vol. 2: Agent Based Computational Economics" 2006 - North-Holland.

*Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	The ability to solve domain specific problems Attendance, (inter)activity during class hours	Written Exam, activity during class hours	50%
Seminar	Tasks completion Attendance	Activity grading	50%
Laboratory	-		
Project	-		
Minimum standard of performance:			

Date of filling in: 26.02.2025	**Responsible**	**Title First name Last name**	**Signature**
	Course	Prof. dr. eng. Adrian GROZA	
	Applications	Prof. dr. eng. Adrian GROZA	

Date of approval in the department 17.09.2025	Head of department, Prof.dr.eng. Rodica Potolea
Date of approval in the Faculty Council 19.09.2025	Dean Prof.dr.eng. Vlad Mureșan