

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University of Cluj-Napoca
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Department of Computer Science
1.4 Field of study	Computer Science
1.5 Study cycle	Master
1.6 Study programme / Qualification	Data Science

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)	Computational Thinking						
2.2 Course coordinator	Conf. Dr. Camelia Şerban						
2.3 Seminar coordinator	Conf. Dr. Camelia Şerban						
2.4. Year of study	1	2.5 Semester	1	2.6. Type of evaluation	E	2.7 Type of discipline	Compulsory
2.8 Code of the discipline	MME8181						

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	3	Of which: 3.2 course	2	3.3 seminar/laboratory	1
3.4 Total hours in the curriculum	42	Of which: 3.5 course	28	3.6 seminar/laboratory	14
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					40
Additional documentation (in libraries, on electronic platforms, field documentation)					40
Preparation for seminars/labs, homework, papers, portfolios and essays					40
Tutorship					5
Evaluations					8
Other activities:					-
3.7 Total individual study hours	133				
3.8 Total hours per semester	175				
3.9 Number of ECTS credits	7				

4. Prerequisites (if necessary)

4.1. curriculum	-
4.2. competencies	-

5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> • Video projector
5.2. for the seminar /lab activities	<ul style="list-style-type: none"> • Computers, specific development environment

6. Specific competencies acquired

Professional competencies	<ul style="list-style-type: none"> • C1.1 Description of programming paradigms and of language specific mechanisms, as well as identification of syntactic and semantic differences. • C1.3 Elaboration of adequate source code and testing of components in a given programming language, based on given specifications. • C1.4 Testing applications based on testing plans. • C1.5 Developing units of programs and corresponding documentation.
Transversal competencies	<ul style="list-style-type: none"> • CT1 Application of efficient and rigorous working rules, manifest responsible attitudes towards the scientific and didactic fields, respecting professional and ethical principles. • CT2 Use of efficient methods and techniques for learning, information, research and development of abilities for knowledge exploitation, for adapting to the needs of a dynamic society and for communication in a widely used foreign language.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	To develop the foundations of Computational Thinking, concepts, methods and techniques
7.2 Specific objective of the discipline	To understand how Computational Thinking can be used by data scientists in order to organize structured and unstructured data for addressing business problems.

8. Content

8.1 Course	Teaching methods	Remarks
1. Introduction to Computational Thinking:	<ul style="list-style-type: none"> • Interactive exposure • Live coding • Explanation • Practical examples • Case-study discussions 	
2. Functions		
3. Testing.		
4. Compound types: list, tuple, dictionary		
5. Searching & Sorting		
6. Modular programming		
7. User defined types		
8. Lambda functions		
9. Introduction to Data Science in Python: Pandas data-frames; Matplotlib plotting		
10-11 Statistical Thinking in Python		
12-14 Intermediate Python for Data Science		
Bibliography		
<ol style="list-style-type: none"> 1. Kleinberg and Tardos – <i>Algorithm Design</i>. Pearson Educational, 2014 2. (http://www.cs.princeton.edu/~wayne/kleinberg-tardos/) 3. <i>The Python language reference</i>. (https://docs.python.org/3/reference/index.html) 4. <i>The Python standard library</i>. (https://docs.python.org/3/library/index.html) 5. <i>The Python tutorial</i>. (https://docs.python.org/3/tutorial/index.html) 6. Kent Beck - <i>Test Driven Development: By Example</i>. Addison-Wesley Longman, 2002. 		

