SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babeş-Bolyai University**
1.2 Faculty	**Faculty of Biology and Geology**
1.3 Department	**Department of Molecular Biology and Biotechnology**
1.4 Field of study	**Biology**
1.5 Study cycle	**Master**
1.6 Study programme / Qualification	**Bioinformatics applied in life sciences**

2. Information regarding the discipline

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

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

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					38
Additional documentation (in libraries, on electronic platforms, field documentation)					36
Preparation for seminars/labs, homework, papers, portfolios and essays					40
Tutorship					4
Evaluations					8
Other activities:					-

3.7 Total individual study hours	126
3.8 Total hours per semester	182
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	• Video projector
5.2. for the seminar /lab activities	• Computers, specific development environment

6. Specific competencies acquired

Professional competencies	• 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	• 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:	• 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

1. Kleinberg and Tardos – *Algorithm Design*. Pearson Educational, 2014
2. (http://www.cs.princeton.edu/~wayne/kleinberg-tardos/)
3. *The Python language reference*. (https://docs.python.org/3/reference/index.html)
4. *The Python standard library*. (https://docs.python.org/3/library/index.html)
5. *The Python tutorial*. (https://docs.python.org/3/tutorial/index.html)
6. Kent Beck - *Test Driven Development: By Example*. Addison-Wesley Longman, 2002.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Simple Applications	• Interactive exposure • Explanation	
2. Simple Applications		
3. Simple Applications		

4. Modular Programming. User defined types 5. Lambda 6. Introduction to Python libraries for Data Science 7. Statistical Thinking	• Conversation • Didactical demonstration	

Bibliography

1. Kleinberg and Tardos – *Algorithm Design*. Pearson Educational, 2014
2. (http://www.cs.princeton.edu/~wayne/kleinberg-tardos/)
3. *The Python language reference*. (https://docs.python.org/3/reference/index.html)
4. *The Python standard library*. (https://docs.python.org/3/library/index.html)
5. *The Python tutorial*. (https://docs.python.org/3/tutorial/index.html)
6. Kent Beck - *Test Driven Development: By Example*. Addison-Wesley Longman, 2002.

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

The course respects the IEEE and ACM Curricula Recommendations for Computer Science studies.
The course exists in the studying program of all major universities in Romania and abroad.
The content of the course is considered the software companies as important for average programming skills

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Know concepts and methods from the domain of Computationl Thinking	Project development for a specific domain	50%
10.5 Seminar/lab activities	Apply the concepts and methods learnt for solving problems to a from a specific domain	Project verification and presentation	50%
10.6Minimum performance standards – minim 5 grade			

Date	**Signature of course coordinator**	**Signature of seminar coordinator**
16.01.2023	**Lect. Dr. Camelia Șerban**	**Lect. Dr. Camelia Șerban**

Date of approval **Signature of the head of department**

..... **Prof. Dr. Laura Dioșan**