

## COURSE DESCRIPTION

Work for Graduation Project

Academic year 2026-2027

### 1. Programme-related data

1.1. Higher Education Institution	<b>Babeş-Bolyai University</b>
1.2. Faculty	<b>Mathematics and Computer Science</b>
1.3. Department	<b>Mathematics</b>
1.4. Field	<b>Mathematics</b>
1.5. Level of study	<b>Bachelor</b>
1.6. Degree programme / Qualification	<b>Mathematics Computer Science (English)</b>
1.7. Form of education	<b>Full-time</b>

### 2. Course-related data

2.1. Course title	<b>Calculus 1 (Calculus on R)</b>			Course code	<b>MLE0001</b>
2.2. Course coordinator	Lect. dr. Grad Anca				
2.3. Seminar coordinator	Lect. dr. Grad Anca				
2.4. Year of study	3	2.5. Semester	6	2.6. Type of assessment	Progress check
2.7. Course status	Compulsory		2.8. Course type	Specialisation subject	

### 3. Total estimated time (hours per semester of teaching activities)

3.1. Number of hours per week	<b>4</b>	of which: 3.2. course	<b>0</b>	3.3. seminar/ laboratory/ project	<b>4</b>
3.4. Total of hours in the curriculum	48	of which: 3.5. course	0	3.6. seminar/ laboratory	<b>48</b>
<b>Time allocation for individual study (IS) and self-taught activities (ST)</b>					<b>hours</b>
Learning from textbooks, course materials, bibliography, and notes (IS)					25
Additional research in the library, on subject-specific electronic platforms, and on-site					10
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					25
Tutoring (professional guidance)					10
Examinations					10
Other activities					0
<b>3.7. Total hours of individual study (IS) and self-taught activities (ST)</b>				<b>80</b>	
<b>3.8. Total hours per semester</b>				<b>150</b>	
<b>3.9. Number of credits</b>				<b>5</b>	

### 4. Prerequisites (where applicable)

4.1. curriculum-related	Years 1,2 3 Mathematics and/or Computer Science
4.2 skills-related	Mathematical thinking, logical thinking

### 5. Specific conditions (where applicable)

5.1. course-related	
5.2. seminar/laboratory-related	Seminar hall with beamer, online groups on MsTeams

### 6.1. Competencies resulting from the completion of the degree programme (as referred to in the curriculum)<sup>1</sup>

<sup>1</sup> The professional and/or transversal skills targeted by the subject for which the course description is prepared will be copied from the curriculum of the degree programme. For each competency, the complete entry, including the competency code, will be copied with the exact wording that appears in the curriculum, without any changes.

Professional competencies	
Competency code	Competency
PC1	Develop problem-solving strategies
PC2	Perform analytical mathematical calculations
PC5	Synthesize information
PC6	Think abstractly
PC7	Communicate mathematical information
Transversal competencies	
Competency code	Competency
TC1	Interpret mathematical information
TC3	Work independently
TC4	Solve problems
TC5	Think analytically
TC6	Master the English language

## 6.2. Learning outcomes relevant to the degree programme (as referred to in the curriculum)<sup>2</sup>

Learning outcomes targeted by the subject		
Competency code	Knowledge and comprehension	Specific academic skills
CP5, CP6, CP7	1. The student/graduate defines the fundamental concepts from the core disciplines of mathematics.	1. The student/graduate provides examples of how fundamental concepts and theoretical results are used in solving exercises and problems related to the topics covered in the curriculum disciplines.
CP1, CT4, CT5	2. The student/graduate compares and distinguishes related notions and their properties from the core disciplines of mathematics.	2. The student/graduate recognizes and analyses the necessary and/or sufficient conditions in the statements of mathematical assertions and specifies their role in the proof.
CP1, CT3	3. The student/graduate formulates observations and differentiates notions, properties, and assertions from the core disciplines of mathematics through examples and counterexamples.	3. The student/graduate identifies and describes the essential elements in the construction of proofs of mathematical assertions (lemmas, propositions, theorems), recognizes errors in reasoning, and corrects them.
CP5, CP6, CT1	4. The student/graduate defines the basic concepts from advanced mathematics disciplines in the curriculum.	4. The student/graduate answers questions and correctly and rigorously formulates the statements of mathematical assertions (lemmas, propositions, theorems) from the disciplines in the curriculum.
CP5, CT5	5. The student/graduate compares and distinguishes related notions and their properties from the advanced mathematics disciplines in the curriculum.	5. The student/graduate reproduces and analyzes the hypotheses and conclusions of mathematical assertions and discusses how these connect within the proof.

If no competency is copied from either of the two categories, the row corresponding to that category is deleted from the table.

<sup>2</sup> The learning outcomes relevant for the degree programme and targeted by the subject for which the course description is prepared will be listed. The entries, copied without any changes from the Curriculum by subject type (Core Subject/Specialisation Subject/Complementary Subject), are listed under the corresponding competency.

CP5, CP7	9. The student/graduate formulates observations and differentiates notions, properties, and assertions from advanced mathematics disciplines through examples and counterexamples.	9. The student/graduate argues the role of elements found in the hypotheses of mathematical assertions, discusses how they articulate within the proof, and independently constructs correct proofs of mathematical assertions from major mathematical disciplines. The student/graduate translates a practical situation into mathematical language, solves the resulting problem, and interprets the obtained results.
CP2	11. The student/graduate indicates and recognizes the concepts involved in the requirements of exercises and problems formulated in the curriculum disciplines.	11. The student/graduate uses numerical methods and software packages to solve constructed mathematical models and interprets the obtained mathematical results from the perspective of the practical problem being modelled.

## 7. Subject-specific learning outcomes

<b>Knowledge and comprehension</b>
<p>1. The student:</p> <ul style="list-style-type: none"> <li>- has acquired the specific skills of mathematics-related disciplines necessary for completing assignments.</li> <li>- knows fundamental notions related to the topology of real numbers as well as to strings, series, differentiable functions and Riemann integrable functions, as well as methods for applying them in areas of science related to mathematics and computer science.</li> </ul>
<p>2. The student is able to:</p> <ul style="list-style-type: none"> <li>- build clear and well-supported mathematical arguments to explain mathematical problems, topics and ideas in writing.</li> <li>- prove theorems using mathematical language in theoretical courses and will be able to present these results both orally and in writing.</li> </ul>
<b>Specific academic skills</b>
The student has the ability to:
1. independently explore certain mathematical contents, based on the ideas and tools already acquired, in order to expand his knowledge.
2. independently extend the mathematical ideas and arguments already acquired, to a mathematical topic that has not been studied previously.

## 8. Contents Lecture, discussion, case study, individual study

8.1. Course	Teaching and learning methods	Remarks <sup>3</sup>
8.2. Seminar/ laboratory	Teaching and learning methods	Remarks
1. The classical structure of a bachelor's thesis in mathematics and computer science. Establishing the supervisor and the research topic.	Lecture, discussion, case study, individual study	Tema 1: specifying the scientific supervisor and the thesis topic
2. Writing in LaTeX or MathType	Lecture, discussion, case study, individual study	Tema 2: LaTeX template/model for a bachelor's thesis
3. Documentation techniques. Academic ethics.	Lecture, discussion, case study, individual study	
4. Establishing the bibliography and the structure of the thesis.	Lecture, discussion, case study, individual study	Tema 3: specifying the main bibliographic resources
5. Developing the chapter with the main theoretical results.	Lecture, discussion, case study, individual study	

<sup>3</sup> For example, organisational aspects, recommendations for students, specific aspects relating to the course/seminar, such as inviting experts in the field, etc.

6. Finalizing the chapter with the main theoretical results.	Lecture, discussion, case study, individual study	Tema 4: chapters 1 and 2 of the thesis
7. Structuring the applications chapter.	Lecture, discussion, case study, individual study	
8. Finalizing the applications chapter.	Lecture, discussion, case study, individual study	Tema 5: chapter 3 of the thesis
9. Finalizing the bachelor's thesis.	Lecture, discussion, case study, individual study	
10. Testing the thesis using anti-plagiarism applications	Lecture, discussion, case study, individual study	
11. Techniques for creating a scientific presentation in LaTeX	Lecture, discussion, case study, individual study	Tema 6: the bachelor's thesis and the similarity report
12. Techniques for presenting the bachelor's thesis.	Lecture, discussion, case study, individual study	Tema 7: presentation of the bachelor's thesis
<b>Bibliography</b> <ol style="list-style-type: none"> <li>Eco Umberto: <i>Cum se face o teză de licență</i>, Polirom, 2020</li> <li>Vivaldi Franco: <i>Mathematical writing</i>, Springer (undergraduate Mathematics Series), 2014</li> <li>Manchester Academic Phrasebank <a href="https://www.phrasebank.manchester.ac.uk/">https://www.phrasebank.manchester.ac.uk/</a></li> <li>Academic writing: <a href="https://www.eapfoundation.com/writing/what/a">https://www.eapfoundation.com/writing/what/a</a></li> <li>Siegfried Nijssen: <i>Writing a Bachelor Thesis in Computer Science</i>, <a href="https://liacs.leidenuniv.nl/~nijssensgr/bachelorklas-2014-2015/writing.pdf">https://liacs.leidenuniv.nl/~nijssensgr/bachelorklas-2014-2015/writing.pdf</a></li> <li>Wiese Andreas: <i>How to write a bachelor/master thesis</i>, <a href="https://www.math.cit.tum.de/fileadmin/w00ccg/math/personen/discrete_math/Andreas_Wiese/writing-thesis.pdf">https://www.math.cit.tum.de/fileadmin/w00ccg/math/personen/discrete_math/Andreas_Wiese/writing-thesis.pdf</a></li> <li>Hardt Wolfram: <i>Guideline for Writing Bachelor thesis</i>, TU Chemnitz, Germany <a href="https://www.tu-chemnitz.de/informatik/ce/files/Guidelines-Bachelor-Thesis.pdf">https://www.tu-chemnitz.de/informatik/ce/files/Guidelines-Bachelor-Thesis.pdf</a></li> </ol>		

## 9. Evaluation



















Type of activity	9.1 Evaluation criteria <sup>4</sup>	9.2 Evaluation methods <sup>5</sup>	9.3 Percentage in the final grade
9.4. Course			
9.5. Seminar/ laboratory	Homework including application of the theoretical results to practical problems	Continuous evaluation during the seminar	50%
	Evaluation of the scientific coordinator	Degree given by the scientific coordinator	50%
9.6 Minimum standard for passing			
- Minimum 5 given by the scientific coordinator			

## 10. SDG labels (Sustainable Development Goals)<sup>6</sup>

<sup>4</sup> The evaluation criteria must directly reflect the learning outcomes targeted at the level of the degree programme respectively at the level of the subject. More specifically, the learning outcomes set out in the expected learning outcomes are assessed.

<sup>5</sup> Both final evaluation methods and ongoing evaluation strategies should be established.

<sup>6</sup> Select a single label which, according to the [Implementation of SDG labels in the academic process](#), best matches the subject. If the subject addresses sustainable development in a generic manner (i.e. by presenting/introducing the general framework of sustainable development, etc.), then the Sustainable Development generic label may be applied. If none of the labels describe the subject, select the last option: "No label applies."

	Sustainable Development Generic Label							
								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
								No label applies
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Date of entry:  
06.04.2026

Signature of course coordinator

Lect. dr. Grad Anca

Signature of seminar coordinator

Lect. dr. Grad Anca

Date of approval in the department:  
24.04.2026

Signature of the head of department

Prof. dr. Andrei Mărcuș