

**Assessment plan for the curriculum of the Bachelor's degree programme in Computing Science, 2025-2026**

Programme director: Vasilios Andrikopoulos

Date advice Board of Examiners:

Submission date to Faculty Board:

### Vision on assessment

1. to enable students to independently show academic skills in a professional context (why), assessment will include activities that require individual and collaborative performance, which each have a substantial contribution to the final grade (what)
2. to install students with the scientific skills essential for contributing to one of the research themes on which the associated research groups are working (why), authentic assessment will be implemented where possible (what)
3. to prepare students for a career in research or design at academia or in an (internationally operating) company (why), assessment is designed to test students independent ability to design and evaluate new computer systems and software in an international and pluricultural context (what)

### Assessment guidelines

1. Every course has at least one mandatory summative element onsite; overall, assessment can be organized either online or onsite.
2. The formative and summative assessments are designed by the course coordinator in such a way that the assessment covers all the intended learning outcomes of the course.
3. Summative assessments in the form of final exams are designed by the course coordinator and are peer reviewed by the second examiner in order to ensure that the exam assesses the course material representatively and sufficiently.
4. Assessment in the form of an oral exam or project presentation is always carried out in the presence of at least 2 examiners (or an examiner and at least one additional expert in the corresponding discipline).
5. All practical work of students should establish a quick (e.g., weekly) feedback loop via formative or summative assessment.
6. Practical work of students should also assess their teamwork and collaboration skills where applicable.
7. Automated testing should be used to increase the amount of formative assessment whenever possible.
8. Courses that have graded components such as assignments that are affected by the use of Generative AI models should either incorporate the adoption of these models in the ILOs for the course; alternatively, course coordinators should consider making these components pass/fail or move completely to formative assessments.
9. The use of Generative AI on behalf of assessors follows the guidelines for the use of 3rd party services at the University with respect to preserving the privacy of students and the intellectual property of the University.

### Learning outcomes of the degree programme

|   | <b>Learning Outcome</b><br><i>At the end of the programme, the graduate ...</i>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Has the following knowledge, understanding and insights on an academic level:<br>a. knowledge of the main topics of Computing Science;<br>b. understanding of common themes and principles of Computing Science on different levels of abstraction;<br>c. insight in the applicability of Computing Science and the interplay between theory and practice;<br>d. either d1: in-depth knowledge of certain topics in the field of Computing Science, or d2: broad-based knowledge of topics in a different discipline. |
| 2 | Has the following skills and competences, on an academic level:<br>a. technical skills associated with Computing Science, including relevant mathematical and logical skills;<br>b. relevant soft skills, including communication, intercultural teamwork and self-managed learning;<br>c. academic skills, including conceptual thinking, critical questioning, judgement forming, scientific research, writing and presenting in English;                                                                           |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | d. the competence to analyse, structure, redefine and solve problems, using computational methods and tools;<br>e. the competence to design, develop and evaluate computer systems;<br>f. the competence to apply their knowledge and understanding of Computing Science in a globalized professional and entrepreneurial context.                                                                                                                                                   |
| 3 | Has the following attitudes:<br>a. appreciation of the role and importance of mathematics, related disciplines and domain-specific knowledge;<br>b. commitment to professional responsibility, including ethical, societal and intercultural issues, with a self-critical attitude;<br>c. critical and academic attitude towards information and knowledge;<br>d. preparedness to life-long learning, based on the awareness of the highly dynamical character of Computing Science. |

#### Overview of assessment methods, test moments for course units, and examiners

This table shows all the course units for each year of the programme and assessment methods.

| Year | Period | Course                                                  | EC | Assessment method(s)<br>Multiple answers may apply | Does (part of the) assessment have a formative function? | First examiner | Second examiner |
|------|--------|---------------------------------------------------------|----|----------------------------------------------------|----------------------------------------------------------|----------------|-----------------|
| 1    | 1a, 1b | Programming Fundamentals WBCSo46-10                     | 10 | WE, PR                                             | Yes                                                      | Meijster       | Westerman       |
| 1    | 1a     | Introduction to Logic (CS) WBCSo30-05                   | 5  | WE, AST                                            | Yes                                                      | Frumin         | Hansen          |
| 1    | 1a     | Introduction to Computing Science WBCSo05-05            | 5  | WE, R, P, PR                                       | No                                                       | Wilkinson      | Frey            |
| 1    | 1b     | Discrete Structures WBCSo11-05                          | 5  | WE                                                 | Yes                                                      | Bliznets       | Hansen          |
| 1    | 1b     | Computer Architecture WBCSo10-05                        | 5  | WE, AST                                            | No                                                       | Merchant       | Hassanpour      |
| 1    | 2a     | Algorithms and Data Structures in C (for CS) WBCSo18-05 | 5  | WE, AST                                            | Yes                                                      | Frey           | Bliznets        |
| 1    | 2a     | Calculus 1 WBCSo55-05                                   | 5  | WE, AST                                            | No                                                       | Kilicer        | Kosinka         |
| 1    | 2a     | Introduction to Information Systems WBCSo21-05          | 5  | WE, AST                                            | Yes                                                      | Riveni         | Karastoyanova   |
| 1    | 2b     | Object-Oriented Programming for CS WBCSo28-05           | 5  | WE, PR, AST                                        | Yes                                                      | Rastogi        | Feitosa         |
| 1    | 2b     | Linear Algebra WBCSo48-05                               | 5  | WE, AST                                            | No                                                       | Ozman          | Kosinka         |
| 1    | 2b     | Computer Networks WBCSo47-05                            | 5  | WE, PR, AST                                        | No                                                       | Hassanpour     | Riveni          |
| 2    | 1a     | Calculus 2 WBCSo54-05                                   | 5  | WE, AST                                            | No                                                       | Karakurt       | Kosinka         |
| 2    | 1a     | Advanced Programming WBCSo53-05                         | 5  | WE, AST                                            | Yes                                                      | Feitosa        | Groefsema       |
| 2    | 1a     | Advanced Algorithms WBCSo52-05                          | 5  | WE, AST                                            | Yes                                                      | Bliznets       | Bunte           |
| 2    | 1b     | Statistics and Probability WBCSo49-05                   | 5  | WE, R, AST                                         | Yes                                                      | Tatar          | Guo             |
| 2    | 1b     | Web Engineering WBCSo08-05                              | 5  | WE, AST                                            | Yes                                                      | Andrikopoulos  | Westerman       |
| 2    | 1b     | Functional Programming WBCSo02-05                       | 5  | WE, PR                                             | Yes                                                      | Meijster       | Frumin          |
| 2    | 2a     | Introduction to Machine Learning WBCSo32-05             | 5  | WE, PR                                             | Yes                                                      | Guo            | Biehl           |
| 2    | 2a     | Operating Systems WBCSo23-05                            | 5  | WE, MC, PR, AST                                    | Yes                                                      | Hassanpour     | Pleiter         |

| Year | Period | Course                                                         | EC   | Assessment method(s)<br>Multiple answers may apply | Does (part of the) assessment have a formative function? | First examiner | Second examiner |
|------|--------|----------------------------------------------------------------|------|----------------------------------------------------|----------------------------------------------------------|----------------|-----------------|
| 2    | 2a, 2b | Software Engineering WBCSo17-10                                | 10   | AST                                                | Yes                                                      | Capiluppi      | Avgeriou        |
| 2    | 2b     | Languages and Machines WBCSo27-05                              | 5    | WE, AST                                            | Yes                                                      | Perez          | Frumin          |
| 2    | 2b     | Introduction to Computer Graphics and Visualization WBCSo56-05 | 5    | MC, AST                                            | No                                                       | Kehl           | Kosinka         |
| 2    | whole  | Algorithmic Programming Contests WBCSo45-05                    | 5    | PR                                                 | Yes                                                      | Ramanayake     | Bliznets        |
| 3    | 1a     | Introduction to Deep Neural Networks WBCSo59-05*               | 5    | WE, AST                                            | Yes                                                      | Guo            | Biehl           |
| 3    | 1a     | Information Retrieval WBCSo40-05*                              | 5    | WE, P, AST                                         | No                                                       | Azzopardi      | Riveni          |
| 3    | 1a     | Computer Graphics WBCSo19-05*                                  | 5    | WE, AST                                            | Yes                                                      | Kosinka        | Frey            |
| 3    | 1a     | Computational Complexity WBCSo44-05*                           | 5    | AST                                                | Yes                                                      | Ramanayake     | Perez           |
| 3    | 1a     | C++ Fundamentals WBCSo33-05**                                  | 5    | WE, AST                                            | Yes                                                      | Bokma          | Feitosa         |
| 3    | 1a     | Signals and Systems for CS WBCSo42-05*                         | 5    | WE, PR                                             | No                                                       | Meijster       | De Weerd        |
| 3    | 1a, 1b | Bachelor Internship WBCSo62-05/WBCSo62-15*                     | 5/15 | R,P                                                | NA                                                       | Andrikopoulos  | supervisors     |
| 3    | 1b     | Introduction to Image Processing WBCSo51-05*                   | 5    | WE, AST                                            | No                                                       | Kehl           | Tursun          |
| 3    | 1b     | Introduction to Augmented Reality WBCSo60-05*                  | 5    | WE, AST                                            | Yes                                                      | Tursun         | Kosinka         |
| 3    | 1b     | Process-aware Information Systems WBCSo50-05*                  | 5    | WE                                                 | No                                                       | Karastoyanova  | Riveni          |
| 3    | 1b     | Programming in C++ WBCSo34-05*                                 | 5    | OR, AST                                            | Yes                                                      | Bokma          | Feitosa         |
| 3    | 1b     | Compiler Construction WBCSo39-05*                              | 5    | WE, PR                                             | Yes                                                      | Meijster       | Westerman       |
| 3    | 1b     | Basic Approaches to the Semantics of Computation WBCSo61-05*   | 5    | AST                                                | Yes                                                      | Perez          | Frumin          |
| 3    | 2a     | Fundamentals of Distributed Systems WBCSo57-05                 | 5    | WE, PR                                             | Yes                                                      | Dustegor       | Haghshenas      |
| 3    | 2a     | Information Security WBCSo04-05*                               | 5    | WE, MC, AST                                        | Yes                                                      | Mohsen         | Turkmen         |
| 3    | 2a     | Research Skills in Computing Science WBCSo26-05                | 5    | R , PR, AST                                        | Yes                                                      | Dustegor       | Kosinka         |
| 3    | 2a     | Advanced Programming in C++ WBCSo35-05*                        | 5    | OE, AST                                            | Yes                                                      | Bokma          | Feitosa         |
| 3    | 2b     | Bachelor's Project                                             | 15   | R, P, PR                                           | NA                                                       | Dustegor       | Mohsen          |

\* Elective \*\* Extracurricular only for CS students, elective for other programmes

The abbreviations for the relevant teaching methods are explained in the legend of the table.

Examples of assessment methods include:

- Written Exam (WE)
- Multiple Choice (MC)
- Oral Exam (OR)
- Report (R)
- Presentation (P)

- Practical Work (PR)
- Assignment (AST)

The assessment method defines the test moments; practical work, assignments are continuous. The rest are final and in some cases halfway, through e.g. a midterm exam.

Relationship between course units and details of the learning outcomes

An x means that the learning outcome is explicitly assessed (not merely addressed) in the course.

|        |                                     | Learning outcomes of the degree programme |        |        |             |             |  |        |        |        |        |        |        |  |        |        |        |        |
|--------|-------------------------------------|-------------------------------------------|--------|--------|-------------|-------------|--|--------|--------|--------|--------|--------|--------|--|--------|--------|--------|--------|
|        |                                     | 1<br>a                                    | 1<br>b | 1<br>c | 1<br>d<br>1 | 1<br>d<br>2 |  | 2<br>a | 2<br>b | 2<br>c | 2<br>d | 2<br>e | 2<br>f |  | 3<br>a | 3<br>b | 3<br>c | 3<br>d |
| Period | Course                              | Year 1 – compulsory courses               |        |        |             |             |  |        |        |        |        |        |        |  |        |        |        |        |
| 1a, 1b | Programming Fundamentals            |                                           |        | x      |             |             |  | x      | x      | x      | x      |        | x      |  | x      |        |        |        |
| 1a     | Introduction to Logic (CS)          | x                                         | x      |        |             |             |  | x      |        |        | x      |        |        |  | x      |        |        |        |
| 1a     | Introduction to Computing Science   | x                                         | x      | x      |             |             |  | x      | x      | x      | x      |        |        |  | x      | x      | x      |        |
| 1b     | Discrete Structures                 | x                                         |        | x      |             |             |  | x      |        |        | x      |        |        |  |        |        | x      |        |
| 1b     | Computer Architecture               | x                                         | x      | x      | x           |             |  |        |        |        |        |        |        |  |        |        |        |        |
| 2a     | Algorithms and Data Structures in C | x                                         | x      | x      |             |             |  | x      | x      |        | x      | x      |        |  |        |        | x      |        |
| 2a     | Calculus 1                          | x                                         |        |        |             |             |  | x      |        |        |        | x      |        |  | x      |        |        |        |
| 2a     | Introduction to Information Systems | x                                         | x      | x      |             |             |  | x      | x      |        |        | x      | x      |  | x      |        |        |        |
| 2b     | Object-Oriented Programming for CS  |                                           | x      | x      |             |             |  |        | x      |        | x      | x      |        |  | x      |        |        |        |
| 2b     | Linear Algebra                      | x                                         |        |        |             |             |  | x      |        |        | x      |        |        |  | x      |        |        |        |
| 2b     | Computer Networks                   | x                                         | x      | x      | x           |             |  | x      |        |        | x      | x      | x      |  |        | x      | x      | x      |
| Period | Course                              | Year 2 compulsory courses                 |        |        |             |             |  |        |        |        |        |        |        |  |        |        |        |        |
| 1a     | Calculus 2                          | x                                         |        |        |             |             |  | x      |        |        |        | x      |        |  | x      |        |        |        |
| 1a     | Advanced Programming                |                                           |        | x      | x           |             |  |        | x      |        | x      | x      |        |  |        |        |        | x      |
| 1a     | Advanced Algorithms                 | x                                         | x      | x      |             |             |  | x      | x      | x      | x      | x      |        |  | x      |        | x      | x      |
| 1b     | Statistics and Probability          | x                                         |        |        |             |             |  | x      |        | x      | x      |        |        |  | x      |        |        |        |
| 1b     | Web Engineering                     | x                                         | x      |        | x           |             |  |        | x      |        | x      |        |        |  |        |        |        | x      |
| 1b     | Functional Programming              |                                           | x      | x      |             |             |  | x      |        | x      | x      |        |        |  | x      |        |        |        |
| 2a     | Introduction to Machine Learning    | x                                         |        | x      | x           |             |  | x      |        |        | x      |        |        |  | x      |        |        | x      |

|               |                                                     | Learning outcomes of the degree programme |   |   |   |   |  |   |   |   |   |   |   |  |   |   |   |   |
|---------------|-----------------------------------------------------|-------------------------------------------|---|---|---|---|--|---|---|---|---|---|---|--|---|---|---|---|
| 2a            | Operating Systems                                   | x                                         | x | x | x |   |  | x |   | x | x |   | x |  |   |   |   | x |
| 2a, 2b        | Software Engineering                                | x                                         |   |   |   |   |  |   | x |   |   | x | x |  |   | x |   |   |
| 2b            | Languages and Machines                              | x                                         | x |   |   |   |  | x |   | x | x |   |   |  |   |   |   |   |
| 2b            | Introduction to Computer Graphics and Visualization | x                                         | x | x | x |   |  | x |   | x | x | x |   |  | x |   | x | x |
|               | Algorithmic Programming Contests                    |                                           |   |   |   |   |  |   |   |   |   |   |   |  |   |   |   |   |
| <b>Period</b> | <b>Course</b>                                       | <b>Year 3 compulsory courses</b>          |   |   |   |   |  |   |   |   |   |   |   |  |   |   |   |   |
| 2a            | Fundamentals of Distributed Systems                 |                                           | x |   | x |   |  | x |   |   | x | x |   |  |   |   |   |   |
| 2a            | Information Security                                | x                                         | x | x | x |   |  | x |   |   | x |   |   |  |   | x | x | x |
| 2a            | Research Skills in Computing Science                |                                           |   |   | x | x |  |   | x | x | x |   | x |  |   | x | x | x |
| 2b            | Bachelor's project                                  |                                           |   | x | x |   |  |   | x |   | x | x | x |  | x | x | x | x |
| <b>Period</b> | <b>Course</b>                                       | <b>Year 3 Electives</b>                   |   |   |   |   |  |   |   |   |   |   |   |  |   |   |   |   |
| 1a            | Introduction to Deep Neural Networks                |                                           |   |   | x |   |  | x |   |   | x | x |   |  |   |   |   |   |
| 1a            | Information Retrieval                               | x                                         | x | x |   |   |  | x | x | x | x | x |   |  | x |   | x |   |
| 1a            | Computer Graphics                                   |                                           |   | x | x |   |  | x |   |   |   |   |   |  |   |   |   | x |
| 1a            | Computational Complexity                            | x                                         | x | x | x |   |  | x |   | x | x |   |   |  | x |   |   |   |
| 1a            | C++ Fundamentals                                    | x                                         |   | x |   |   |  | x | x |   | x |   |   |  |   |   |   |   |
| 1a            | Signals and Systems for CS                          |                                           | x | x |   |   |  | x |   | x |   |   | x |  |   |   |   |   |
| 1a, 1b        | Bachelor Internship                                 |                                           |   | x | x |   |  |   | x |   | x | x | x |  | x | x | x | x |
| 1b            | Introduction to Image Processing                    | x                                         |   | x | x |   |  | x |   |   | x | x |   |  | x |   | x | x |
| 1b            | Introduction to Augmented Reality                   |                                           |   |   | x |   |  | x |   |   | x | x |   |  |   |   |   |   |
| 1b            | Process-aware Information Systems                   | x                                         |   | x |   |   |  | x |   |   | x |   |   |  |   |   | x |   |
| 1b            | Programming in C++                                  | x                                         | x | x |   | x |  | x | x | x | x | x |   |  | x | x |   |   |
| 1b            | Compiler Construction                               | x                                         | x | x | x |   |  | x |   |   | x | x |   |  | x |   |   |   |
| 1b            | Basic Approaches to the Semantics of Computation    |                                           | x |   | x |   |  | x |   |   | x | x |   |  |   |   |   |   |
| 2a            | Advanced Programming in C++                         | x                                         | x | x |   | x |  | x | x | x | x | x |   |  |   | x | x |   |

List of Examiners for the Bachelor Computing Science 2025-2026

| Name                                       | Examiner Bachelor project | Course examiner |
|--------------------------------------------|---------------------------|-----------------|
| <a href="#">prof. dr. V. Andrikopoulos</a> | X                         | X               |
| <a href="#">prof. dr. P. Avgeriou</a>      | X                         | X               |
| <a href="#">dr. G. Azzopardi</a>           | X                         | X               |
| <a href="#">prof. dr. M. Biehl</a>         | X                         | X               |
| <a href="#">J. Bokma</a>                   |                           | X               |
| <a href="#">prof dr. K. Bunte</a>          | X                         | X               |
| <a href="#">prof. dr. A. Capiluppi</a>     | X                         | X               |
| <a href="#">dr. D. Düstegör</a>            | X                         | X               |
| <a href="#">dr. D. Feitosa</a>             | X                         | X               |
| <a href="#">dr. S.D. Frey</a>              | X                         | X               |
| <a href="#">dr. J. Guo</a>                 | X                         | X               |
| <a href="#">prof. dr. H.H. Hansen</a>      | X                         | X               |
| <a href="#">prof. dr. D. Karastovanova</a> | X                         | X               |
| <a href="#">prof. dr. J. Kosinka</a>       | X                         | X               |
| <a href="#">prof. dr. A. Lazovik</a>       | X                         | X               |
| <a href="#">dr. A. Meijster</a>            | X                         | X               |
| <a href="#">dr. F.F.M. Mohsen</a>          | X                         | X               |
| <a href="#">prof. dr. J.A. Perez Parra</a> | X                         | X               |
| <a href="#">dr. D.R.S. Ramanavake</a>      | X                         | X               |
| <a href="#">dr. A. Rastogi</a>             | X                         | X               |
| <a href="#">dr. M. Riveni</a>              | X                         | X               |
| <a href="#">prof. dr. M. Stal</a>          | X                         |                 |
| <a href="#">dr. C. Tursun</a>              | X                         | X               |
| <a href="#">prof. dr. T. van der Storm</a> | X                         | X               |
| <a href="#">dr. F. Turkmen</a>             | X                         | X               |
| <a href="#">dr. M.H.F. Wilkinson</a>       | X                         | X               |
| <a href="#">dr. A.E. Tatar</a>             | X                         | X               |
| <a href="#">dr. M. Babai</a>               | X                         | X               |
| <a href="#">dr. B. Setz</a>                | X                         |                 |
| <a href="#">dr. K. Haghshenas</a>          | X                         | X               |
| <a href="#">dr. H. Groefsema</a>           | X                         | X               |
| <a href="#">dr. I. Bliznets</a>            | X                         | X               |
| <a href="#">dr. R. Zare Hassanpour</a>     | X                         | X               |
| <a href="#">dr. C. Kehl</a>                | X                         | X               |
| <a href="#">dr. D. Frumin</a>              | X                         | X               |
| <a href="#">dr. K. Li</a>                  | X                         | X               |
| <a href="#">dr. F.A. Merchant</a>          | X                         | X               |
| <a href="#">dr. S.K. Pandev</a>            | X                         | X               |
| <a href="#">prof.dr. D.H. Pleiter</a>      | X                         | X               |

| Name                                                 | Examiner Bachelor project | Course examiner |
|------------------------------------------------------|---------------------------|-----------------|
| <a href="#">dr. A. Tsvganov</a>                      | X                         | X               |
| <a href="#">E.P. Westerman</a>                       |                           | X               |
| <a href="#">D.J. Visscher</a>                        |                           | X               |
| <a href="#">prof. dr. N. Petkov</a>                  | X                         |                 |
| <a href="#">prof. dr. G.R. Renardel de Lavalette</a> | X                         |                 |
| <a href="#">prof. dr. J.B.T.M. Roerdink</a>          | X                         |                 |
| <a href="#">dr. R. Smedinga</a>                      | X                         |                 |

For thesis projects, projects part of Research Skills in Computing Science, and the Bachelor Internship, PhD students and Postdocs can serve as second examiner.