university of groningen

Appendices for the Bachelor's degree programme(s) in Computing Science 2026-2027

Appendix I. Learning outcomes of the Bachelor's degree programme (Art. 3.1.1)

Holders of a Bachelor's degree in Computing Science:

1. Have the following knowledge, understanding and insights on an academic level:
    a. knowledge of the main topics of Computing Science;
    b. understanding of common themes and principles of Computing Science on different levels of abstraction;
    c. insight in the applicability of Computing Science and the interplay between theory and practice;
    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. Have the following skills and competences, on an academic level:
    a. technical skills associated with Computing Science, including relevant mathematical and logical skills;
    b. relevant soft skills, including communication, intercultural teamwork and self-managed learning;
    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;
    e. the competence to design, develop and evaluate computer systems;
    f. the competence to apply their knowledge and understanding of Computing Science in a globalized professional and entrepreneurial context.

3. Have the following attitudes:
    a. appreciation of the role and importance of mathematics, related disciplines and domain-specific knowledge;
    b. commitment to professional responsibility, including ethical, societal and intercultural issues, with a self-critical attitude;
    c. critical and academic attitude towards information and knowledge;
    d. preparedness to life-long learning, based on the awareness of the highly dynamical character of Computing Science.

Appendix II. Majors and Minors (Art. 3.7.4 and 7.1.3)

The degree programme has the following Major:

Computing Science (RIO 56978)

The degree programme has the following Minor(s):

The degree programme includes a 30 ECTS free minor space, see also TER article 7.1.
Students can fill in their Minor slot with the following components:

- University minor : as stated in Article 8.2.2, students are free to take any University Minor as a broadening module. The University minor **Data Wise: Data Science in Society Minor** organized by the Faculty of Behavioural and Social Sciences is not approved, **as the contents significantly overlap** with the Computing Science BSc programme. The University Minor **Artificial Intelligence** is also not approved for this reason.
  It is also not possible to include a course from a University Minor if an equivalent or similar course is already taught in the Computing Science BSc programme.

- a study period at another university (national or abroad): formal approval of the Board of Examiners is required.

- a Teacher Training Minor (see also TER article 8.6)

- a broadening and/or deepening Minor, comprising of course units from outside their own major. Students can choose BSc Computing Science elective courses.

- an internship worth a maximum of 15 ECTS as part of the 30 ECTS free minor space [WBCS062-05 or WBCS062-15]. This can be an in-company internship (15 ECTS) or a research internship (5 ECTS).

- personal minor: A study programme compiled by the student, representing 30 ECTS, and consisting of course units at the UG or elsewhere. Formal approval of the Board of Examiners is required.

Formal approval of the Board of Examiners is required, in case and before a student would like to deviate from these rules (e.g. including course units from other programmes and universities).

Appendix III. Course units in the first year of the degree programme

- **List of course units (Art. 4.1.1 and 9.4.3)**
- **Compulsory order of examinations (Art. 9.3)**

First year

The first year consists of eleven mandatory course units (60 ECTS; Table 1). Course details including modes of instruction, modes of assessment and examination are described in OCASYS.

Table 1. Mandatory course units- Year 1

Course unit name	Course code	ECTS
Programming Fundamentals	WBCS046-10	10
Introduction to Computing Science	WBCS005-05	5
Introduction to Logic (CS)	WBCS030-05	5
Discrete Structures	WBCS011-05	5
Computer Architecture	WBCS010-05	5
Calculus 1	WBCS055-05	5
Algorithms and Data Structures in C (for CS)	WBCS018-05	5
Introduction to Information Systems	WBCS021-05	5
Object-Oriented Programming (for CS)	WBCS028-05	5
Linear Algebra	WBCS048-05	5
Computer Networks	WBCS047-05	5
Total		**60**

There is no formal order of examinations for any of the course units in the first year.

Appendix IV. Course units in the second and third years of the degree programme

- **List of course units (Art. 7.1.1 and 9.4.3)**
- **Compulsory order of examinations (Art. 9.3)**

Second year

The second year consists of eleven mandatory course units (60 ECTS; Table 2). Course details including modes of instruction, modes of assessment and examination are described in OCASYS.

Table 2. Mandatory course units- Year 2

Course unit name	Course code	ECTS
Advanced Algorithms	WBCS052-05	5
Advanced Programming	WBCS053-05	5
Calculus 2	WBCS054-05	5
Functional Programming	WBCS002-05	5
Web Engineering	WBCS008-05	5
Statistics and Probability	WBCS049-05	5
Introduction to Machine Learning	WBCS032-05	5
Software Engineering	WBCS017-10	10
Operating Systems	WBCS023-05	5
Languages and Machines	WBCS027-05	5
Introduction to Computer Graphics and Visualization	WBCS056-05	5
Total		**60**

There is no formal order of examinations for any of the course units in the second year.

Third year
The third year consists of 30 ECTS mandatory (table 3) and 30 ECTS elective courses (Minor). The content of the minor is determined by the student. Computing Science offers elective course units that may be used to fill (part of) the Minor.

Table 3. Mandatory Courses- Year 3

Course unit name	**Course code**	**ECTS**
Research Skills in Computing Science	WBCS026-05	5
Information Security	WBCS004-05	5
Fundamentals of Distributed Systems	WBCS057-05	5
Bachelor's project	WBCS901-15	15
Total		**30**

Table 4. Optional elective course units offered by Computing Science- Year 3

Course unit name	**Course code**	**ECTS**
Introduction to Deep Neural Networks	WBCS059-05	5
Computational Complexity	WBCS044-05	5
Information Retrieval	WBCS040-05	5
Computer Graphics	WBCS019-05	5
Compiler Construction	WBCS039-05	5
Programming in C++	WBCS034-05	5
Signals and Systems for CS	WBCS042-05	5
Introduction to Automated Reasoning	WBCS063-05	5
Introduction to Image Processing	WBCS051-05	5
Process-aware Information Systems	WBCS050-05	5
Basic Approaches to the Semantics of Computation	WBCS061-05	5
Bachelor Internship*	WBCS062-05	5
Bachelor Internship*	WBCS062-15	15
Parallel Computing	WBCS029-05	5

*Students can take one option of the Bachelor Internship: the 15 ECTS- in-company or the 5 ECTS- Research.

C++ Fundamentals *WBCS033-05- is not part of the CS curriculum but is an elective for other programmes.*

Compulsory order of examinations (art. 9.3)

The examinations for the course units listed below may not be taken before the examinations for the associated course units have been passed:

Course unit name	Course code	Entry requirements	Course Code
Introduction to Deep Neural Networks	WBCS059-05	Introduction to Machine Learning *or* Introduction to Machine Learning (for AI)	WBCS032-05 *or* WBAI056-05
Bachelor Internship	WBCS062-05	Software Engineering	WBCS017-10
Bachelor Internship	WBCS062-15	Software Engineering	WBCS017-10
Computer Graphics	WBCS019-05	Calculus 1 Linear Algebra	WBCS055-05 WBCS048-05
Signals and Systems for CS	WBCS042-05	Calculus 1 Linear Algebra	WBCS055-05 WBCS048-05
Basic Approaches to the Semantics of Computation	WBCS061-05	Languages and Machines	WBCS027-05
Bachelor's project	WBCS901-15	Completion of all first- year course units Completion of at least 75 ECTS from years 2 and 3 of the Bachelor Computing Science Submission of study programme in Progress Portal The entry requirements are checked after block 1b	

Appendix V. Contact hours (Art. 3.6.1)

Degree programme	
Structure contact hours	**Contact hours per year**
Lectures	280
Tutorials	216
Practical	112
Study support/Mentor groups	–
Internship support and guidance	–
Exams	43

Appendix VI. Additional requirements Open Degree programmes (Art. 7.3)

In exceptional circumstances students wishing to pursue an open degree programme may file a request with the Board of Examiners. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme and can determine further conditions in their Rules and Regulations.

Appendix VII. Transitional provisions (Art. 12.1)

Students who have already completed a discontinued course are excluded from taking the respective replacement course. Any cases not listed in the Teaching and Examination Regulations, through either the current curriculum or the transitional provisions, are to be treated by the Board of Examiners of the degree programme.

Current curriculum		**Previous courses/ replacements**		
Course Name	**Course Code**	**Course Name**	**Course code**	**Valid until and including**
Programming Fundamentals	WBCS046-10	Imperative Programming for CS AND Program Correctness	WBCS003-05 AND WBCS024-05	2027-2028
Calculus 1	WBCS055-05	Calculus for CS	WBCS036-05	2027-2028
Linear Algebra	WBCS048-05	Linear Algebra & Multivariable Calculus	WBAI050-05	2027-2028
Advanced Algorithms	WBCS052-05	Advanced Algorithms and Data Structures	WBCS009-05	2027-2028
Advanced Programming	WBCS053-05	Advanced Object-Oriented Programming	WBCS001-05	2027-2028
Statistics and Probability	WBCS049-05	Statistics	WBAI049-05	2027-2028
Bachelor Internship	WBCS062-05 WBCS062-15	Short Programming Project	WBCS015-05	2028-2029