Assessment plan for the curriculum of the **Bachelor's** degree programme in Computing Science, 2024-2025

Programme director: Alexander Lazovik

Date advice Board of Examiners: 07-06-2024

Date approval Faculty Board:

1. Vision on assessment

1. to prepare students to contribute to technological developments in computing science and related disciplines (why), assessment tests students fundamental knowledge and skills to improve existing and develop new computer systems and software (what)
2. to stimulate students academic development (why), assessment is designed to quantify and trace how CS related academic skills, as well as more general academic skills, are progressively developed in each year of the programme (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 the theoretical concepts of their discipline and practical skills from an international and pluricultural perspective and in an environment of state-of-the-art research and design (what)

2. Assessment guidelines

Please explain the general assessment procedures that are used in the programmes. For example, 4-eyes principle in test design, standardized grading forms, rubrics.

1. Every course has a mandatory summative element onsite; overall, assessment can be organized either online or onsite.
2. The formative and summative assessment 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 is carried out by 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 graded assessment
6. Automated testing should be used to increase the amount of formative assessment whenever possible

3. Learning outcomes of the degree programme

Learning outcomes for the degree programme, further specified learning outcomes (where relevant) and/or specified for tracks within the degree programme. Please add extra rows if necessary.

	Learning Outcome *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.

4. Overview of assessment methods, and examiners

This table shows all the course units for each year of the programme and assessment methods. Please add extra rows if necessary.

Year	Period	Course	Course code	EC	Assessment methods	Does (part of the) assessment have a formative function?	First examiner	Second examiner
1	1a-1b	Programming Fundamentals	WBCS046-10	10	WE, PR	No	A. Meijster	J. Perez
1	1a	Introduction to Logic (CS)	WBCS030-05	5	WE, AST	Yes	H. Hansen	D. Frumin
1	1a	Introduction to Computing Science	WBCS005-05	5	WE, R, P, PR	No	M. Wilkinson	S. Frey
1	1b	Discrete Structures	WBCS011-05	5	WE	Yes	I. Bliznets	H. Hansen
1	1b	Computer Architecture	WBCS010-05	5	WE, AST	No	R. Zare Hassanpour	F. Merchant
1	2a	Algorithms and Data Structures in C (for CS)	WBCS018-05	5	WE, AST	No	S. Frey	I. Bliznets
1	2a	Calculus 1	WBCS055-05	5	WE, AST	No	P. Kilicer	J. Kosinka
1	2a	Introduction to Information Systems	WBCS021-05	5	WE, AST	Yes	M. Riveni	D. Karastoyanova
1	2b	Object-Oriented Programming for CS	WBCS028-05	5	WE, PR, AST	Yes	A. Rastogi	D. Feitosa

Year	Period	Course	Course code	EC	Assessment methods	Does (part of the) assessment have a formative function?	First examiner	Second examiner
1	2b	Linear Algebra	WBCS048-05	5	WE. AST	No	E. Ozman	J. Kosinka
1	2b	Computer Networks	WBCS047-05	5	WE, PR, AST	No	R. Zare Hassanpour	M. Riveni
2	1a	Calculus 2	WBCS054-05	5	WE, AST	No	A.V. Kiselev	J. Kosinka
2	1a	Advanced Programming	WBCS053-05	5	WE, AST	No	D. Feitosa	H. Groefsema
2	1a	Advanced Algorithms	WBCS052-05	5	WE, AST	No	I. Bliznets	K. Bunte
2	1b	Statistics and Probability	WBCS049-05	5	WE, R, AST	Yes	A.E. Tatar	J. Guo
2	1b	Web Engineering	WBCS008-05	5	WE, AST	Yes	V. Andrikopoulos	A. Lazovik
2	1b	Functional Programming	WBCS002-05	5	WE, PR	No	A. Meijster	D. Frumin
2	2a-2b	Software Engineering	WBCS017-10	10	AST	No	A. Capiluppi	P. Avgeriou
2	2a	Introduction to Machine Learning	WBCS032-05	5	WE, PR	Yes	J. Guo	M. Biehl
2/3	2a	Operating Systems	WBCS023-05	5	WE, MC, PR, AST	No	R. Zare Hassanpour	F. Merchant

Year	Period	Course	Course code	EC	Assessment methods	Does (part of the) assessment have a formative function?	First examiner	Second examiner
2	2b	Languages and Machines	WBCS027-05	5	WE, AST	Yes	J.A. Perez	D. Frumin
2	2b	Introduction to Computer Graphics and Visualization	WBCS056-05	5	MC, AST	No	C. Kehl	J. Kosinka
3	1a	Information Security *	WBCS004-05	5	WE, MC, AST	Yes	F. Mohsen	F. Turkmen
3	1a	Information Retrieval *	WBCS040-05	5	WE, P, AST	No	G. Azzopardi	M. Riveni
3	1a	Computational Complexity *	WBCS044-05	5	AST	Yes	R. Ramanayake	J.A. Perez
3	1a	Compiler Construction *	WBCS039-05	5	WE, PR	No	A. Meijster	J.A. Perez
3	1b	Introduction to Image Processing *	WBCS051-05	5	MC, AST	No	C. Kehl	C. Tursun
3	1b	Signals and Systems CS *	WBCS042-05	5	WE, PR	No	A. Meijster	H. de Weerd
3	1b	Process-aware Information Systems *	WBCS050-05	5	WE	No	D. Karastoyanova	M. Riveni
3	1b	Programming in C++ *	WBCS034-05	5	OR, AST	No	J. Bokma	D. Feitosa

Year	Period	Course	Course code	EC	Assessment methods	Does (part of the) assessment have a formative function?	First examiner	Second examiner
3	1b	Short Programming Project *	WBCS015-05	5	R, PR	No	[supervising lecturers]	K. Bunte
3	2a	Computer Graphics	WBCS019-05	5	WE, AST	Yes	J. Kosinka	S. Frey
3	2a	Research Skills in CS	WBCS026-05	5	R , PR, AST	Yes	J. Kosinka	D. Pleiter
3	2a	Advanced Programming in C++ *	WBCS035-05	5	OE, AST	No	J. Bokma	D. Feitosa
3	2b	Bachelor's Project	WBCS901-15	15	R, P, PR	No	[supervising lecturers], P. Avgeriou	G. Azzopardi
X	1a	C++ Fundamentals **	WBCS033-05	5	WE, AST	No	J. Bokma	D. Feitosa

** 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)*

5. Relationship between course units and details of the learning outcomes

Please note in the table below the course units per block in the programme. Indicate which learning outcomes are assessed in which courses by adding an X in the relevant cell. Please add extra rows if necessary.

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

An x means that the learning outcome is addressed in the course

		Learning outcomes of the degree programme															
		1a	1b	1c	1d1	1d2		2a	2b	2c	2d	2e	2f		3a	3b	3c	3d
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 (for CS)	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**																

		Learning outcomes of the degree programme																
		1a	1b	1c	1d1	1d2		2a	2b	2c	2d	2e	2f		3a	3b	3c	3d
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-2b	Software Engineering	x							X			X	X			X		
2a	Introduction to Machine Learning	X		X	X			X			x				x			x
2a	Operating Systems	X	X	x	x			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
Period	**Course**	**Year 3 compulsory courses**																
2a	Computer Graphics			X	X			X										x
2a	Operating Systems	X	X	x	x			x		x	x		X					x
2a	Research Skills in CS				x	x			X	X	X		X			X	x	x
Period	**Course**	**Year 3 Electives**																
1a	Information Security	x	x	x	X			x			x					x	X	x

		Learning outcomes of the degree programme																
		1a	1b	1c	1d1	1d2		2a	2b	2c	2d	2e	2f		3a	3b	3c	3d
1a	Information Retrieval	X	X	x				X	x	x	x	x			x		x	
1a	Computational Complexity	X	X	x	X			X		X	X				X			
1a	Compiler Construction	X	X	X	X			X			X	X			X			
1b	Introduction to Image Processing	X		X	X			X			X	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	Short Programming Project			x				X	x	x	x	X			x			
1b	Signals and Systems CS		x	X				X		x			X					
2a	Advanced Programming in C++	x	x	x		x		x	X	x	x	x				x	x	
1a	C++ Fundamentals *	x		x				x	x		x							

** Only extracurricular for CS, an elective for other degree programmes*

6. List of examiners for the Bachelor Project Computing Science

prof. dr. V. Andrikopoulos
prof. dr. P. Avgeriou
dr. G. Azzopardi
prof. dr. M. Biehl
prof dr. K. Bunte
prof. dr. A. Capiluppi
dr. D. Düstegör
dr. D. Feitosa
dr. S.D. Frey
dr. J. Guo
prof. dr. H.H. Hansen

prof. dr. D. Karastoyanova
prof. dr. J. Kosinka
G.A.H. Laugs
prof. dr. A. Lazovik
dr. A. Meijster
dr. F.F.M. Mohsen
prof. dr. J.A. Perez Parra
dr. D.R.S. Ramanayake
dr. A. Rastogi
dr. M. Riveni
prof. dr. M. Stal
dr. C. Tursun

prof. dr. T. van der Storm
dr. F. Turkmen
dr. M.H.F. Wilkinson
dr. A.E. Tatar
dr. M. Babai
dr. B. Setz
dr. K. Haghshenas
dr. H. Groefsema
dr. I. Bliznets
dr. R. Zare Hassanpour
dr. C. Kehl
dr. D. Frumin

dr. K. Li
dr. F. Merchant
prof. dr. N. Petkov
prof. dr. G.R. Renardel de Lavalette
prof. dr. J.B.T.M. Roerdink
dr. R. Smedinga