Appendix: Bachelor's degree programme in Computing Science 2015-2016

Appendix I – Learning outcomes of the degree programme (art. 1.3)

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 – Follow-on Master's degree programmes (art. 1.5)

The Bachelor's degree programme will grant unconditional admission to the following Master's degree programmes at the University of Groningen:
- Computing Science
- Education and Communication in Mathematics and Natural Sciences (Science Communication programme)
- Energy and Environmental Sciences
- Science, Business & Policy profile

Appendix III – Majors and Minors in the degree programme (art. 2.1.2)

The degree programme has one Major: Computing Science.
However, the programme offers one specialization in the form of the Business Computing track, which comprises 35 ECTS (including 5 ECTS for the course Business Intelligence, which will be a third year course starting from the academic year 2016–2017), substituting course units from the regular programme.

Appendix IV – Course units in the propaedeutic phase, regular track (art. 3.1.1, 3.2)

Course unit name	ECTS	Type of examination	Practical
Imperative Programming	5	p,e	x
Introduction to Computing Science	5	p,e	x
Introduction to Logic (CS & MA)	5	p,e	x
Discrete Structures	5	p,e	
Computer Architecture	5	p,e	x
Calculus for Computing Science	5	p,e	x
Algorithms and Data Structures in C	5	p,e	x
Introduction to Scientific Computing	5	p,e	x
Program Correctness	5	p,e	
Artificial Intelligence 1	5	p,e	x
Object-Oriented Programming	5	p,e	x
Linear Algebra & Multivariable Calculus for AI&CS	5	p,e	
Total	**60**		

(p=practical and/or homework, e=examination, x=computer practical)

Appendix V – Course units in the post-propaedeutic phase (art. 6.1, 6.2, 7.4)

Course unit	ECTS	Type of examination	Practical
Functional Programming	5	p,e	x
Advanced Object Oriented Programming	5	p	x
Statistics (AI and CS)	5	p,e	x
Software Analysis and Design	5	p	x
Introduction to Information Systems	5	p,e	x
Signals and Systems	5	p,e	x
Advanced Algorithms and Data Structures	5	p,e	x
Software Engineering I	5	p	x
Computing Science: Ethical and Professional Issues	5	p,e	x
Software Engineering II	5	p	x
Parallel Computing	5	p,e	x
Languages and Machines	5	p,e	

1.   Optional Minor, or
2.   Specializing Minor CS:
    Requirements Engineering and Software Startups
    Information Security
    Introduction to Intelligent Systems
    Software Quality Assurance and Testing
    Compiler Construction
    Short programming project
	30
	30
	5
	5
	5
	5
	5
	5
		
		p,e
		p,e
		p,e
		p
		p,e
		p
			
			x
			x
			x
			x
			x
			x

NetComputing	5	p,e	x
Computer Graphics	5	p,e	x
Operating Systems	5	p,e	x
Bachelor's project	15	thesis and colloquium	variable
Total	**120**		

(p=practical and/or homework, e=examination, x=computer practical)

Business Computing track

In the Business Computing track, a number of course units from the regular track are substituted (see table below):

Course unit	ECTS	Type of examination	Practical
Marketing for E&BE (instead of Computing Science: Ethical and Professional Issues)	5	p,e	
Management of Product Innovation (instead of Languages and Machines)	5	p,e	x
International Business & Supply Chain Marketing (instead of Computer Graphics)	5	p,e	x
Bachelor's project in Business Computing (instead of Bachelor's project)	15	thesis and colloquium	variable

(p=practical and/or homework, e=examination, x=computer practical)

Examination requirements

The examinations for the course units listed below may not be taken before the examinations for the associated course units have been passed:
- Signals and Systems after having passed Calculus for Computing Science and Linear Algebra & Multivariable Calculus for AI&CS.
- Bachelor's project after having gained the propaedeutic certificate and earned 60 ECTS from years 2 and 3.

Appendix IX – Contact hours in the propaedeutic phase

Bachelor year 1	
Type of contact	*Number of contact hours per year*
Lectures	280
Tutorials	216
Practical	112
Study support/Mentor groups	–
Internship support and guidance	–
Exams	43
Misc. contact hours	–