Module Description for Module 1: Algebra

Module title	Algebra
Module number	M1
Programme	Computer Science
Applicability of the module	Applicable to other Computer Science Bachelor programmes
Module duration	1 semester
Status	Compulsory module
Recommended semester during the programme	1
Credit points (Cp) of the module	5
Prerequisites for module participation	None
Prerequisites for module examination	None
Module examination	Written exam - 90 minutes
Intended learning outcomes /acquired competences of the module	The students acquire knowledge of the structural and logic basics of electronic information processing. They are to be acquainted with abstract mathematical terms. The students have the ability to independently develop abstract concepts and to acquire basic techniques or processes They are acquainted with the essential concepts, structures and methods of basic algebra and linear algebra. In particular, they are well-acquainted with basic algebraic structures necessary for the comprehension of formal structures in Computer Science and they are proficient in handling them. The following extracurricular skills are acquired: analytical thinking, development of methodological expertise, handling abstract methods, structures and models.
Contents of the module	Lecture Algebra Exercise Algebra
Teaching methods of the module	Lectures and exercises
Total workload	150 h (5% extracurricular skills)
Language of the module	English
Frequency of the module	Annually

Unit Description for Module 1: Lecture Algebra

Name of the unit	Lecture Algebra
Code	
Corresponding module	Algebra
Lecturer	Prof. Dr. Egbert Falkenberg, Prof. Dr. Manfred Hannemann, Prof. Dr. Ruth Schorr, Prof. Dr. Matthias Schubert

Contents of the unit	In the following there is a list of possible topics for the contents focuses. The focuses can be treated at different depths
	 ➢ Basics
	    – Propositional and predicate logic, methods of proof
	    – Quantities
	    – Relations including functions
	    – Induction and recursion
	 ➢ Elementary Number Theory
	    – Number systems
	    – Primes and dividers
	    – Modulo calculation
	    – Application cryptography
	 ➢ Groups, Rings, Fields
	 ➢ Linear Algebra
	    – Vector spaces
	    – Systems of linear equations
	    – Matrices
	    – Linear maps

Teaching methods	Lecture
Contact hours per week	4
Total workload of the unit (h)	100
Total time of contact hours (h)	60
Total time of examination incl. preparation (h)	10
Total time of practical training (h)	
Total time of self-study (h)	30
Language of the unit	English
Recommended reading	• Brill, Manfred: Mathematik für Informatiker, Hanser, 2005 • Denecke, Klaus: Algebra und Discrete mathematics für Informatiker, Vieweg + Teubner, 2003 • Schubert, Matthias: Mathematik für Informatiker, Vieweg + Teubner, 2009

	• Teschl, Gerold und Susanne: Mathematik für Informatiker, Band 1 Discrete mathematics und Lineare Algebra, Springer, 2008 • Witt, Kurt-Ulrich: Algebraische Grundlagen der Informatik, Vieweg, 2007 Current literature will be announced at the beginning of the semester.
Type and form of assessment	Written exam 90 minutes
Grading of the assessment	Differentiated Grades 1 to 4, 5 = unsatisfactory
Further information	

Unit Description for Module 1: Exercise Algebra

Name of the unit	Exercise Algebra
Code	
Corresponding module	Algebra
Lecturer	Prof. Dr. Egbert Falkenberg, Prof. Dr. Manfred Hannemann, Prof. Dr. Ruth Schorr, Prof. Dr. Matthias Schubert
Contents of the unit	Tasks and examples of the lecture topics. The exercises serve to ensure that the students learn to understand the algebraic topics of tasks and solve them with the methods discussed. The students are continuously provided with qualified individual feedback which supports their specific learning experience..
Teaching methods	Exercise
Contact hours per week	2
Total workload of the unit (h)	50
Total time of contact hours (h)	30
Total time of examination incl. preparation (h)	
Total time of practical training (h)	
Total time of self-study (h)	20
Language of the unit	English
Recommended reading	See Unit Lecture Algebra
Type and form of assessment	No proficiency certificate
Grading of the assessment	
Further information	