Module description: Discrete Mathematics

Module Code	t.BA.ITM.DM.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IAMP
Module Coordinator	Dandolo Flumini
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 2b 2 times 2 lecture lessons (not necessarily consecutive) per semester week and class
Module Description	The module imparts general mathematical fundamentals as well as an introduction to topics in discrete mathematics. The course is specifically tailored to the computer science program. The foundational knowledge provided forms the basis for subsequent specialized lectures (e.g., theoretical computer science, programming).
Module Content	**Basic concepts: sets of numbers, propositions, predicates, and quantifiers.** **Set theory: elementhood, subsets, extensionality** **Set theory: replacement and comprehension principles** **Set operations: powerset, union, intersection** **Cardinalities: countable and uncountable sets, first- and second- diagonal argument** **Relations: tuples and set products** **Functions as relations** **Equivalence relations, equivalence classes and partitions** **Ordering relations, Hasse diagrams, the Marczewski-Szpilrajn theorem** **Recursive structures: natural numbers, Peano axioms and induction, well-founded induction, inductive definitions, and structural induction.** **Elementary number theory: divisibility and Euclidean algorithm** **Prime numbers and integer factorization** **Modular arithmetic and Bézout's lemma** **Chinese remainder Theorem and solving Systems of linear congruencies.** **Fermat's little theorem**
Prerequisite Knowledge	none

Learning Objectives (Competences)	Students...	Competencies	Taxonomies
	Students understand the basic terminology of mathematics. Students meet the field's standards in precision and rigor in expressing mathematical statements. Students are familiar with important mathematical concepts for computer science and have the mathematical tools they need for advanced lectures.	F	K1

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Performance Assessment	**End-of-module exam**	**Assessment**	**Length (min.)**	**Weighting**	**Form**
	written exam	Grade	90	80	acc. to module agreement

	Performance assessment during the semester	**Assessment**	**Length (min.)**	**Weighting**	**Form**
	Assessment according to the module agreement.	Grade		20	acc. to module agreement

Classroom Attendance Requirement	None
Learning material	
Comments	In the first week of the semester, the exact number and duration of tests will be communicated for all instances of the module.