Computer Science Essentials elective package

Computer Science Essentials (This flyer will be updated soon)	
Offered by	Department of Mathematics and Computer Science
Language	English
Primarily interesting for	All students, but most relevant for students with background in Majors other than Computer Science & Engineering
Prerequisites	The student has knowledge of propositional logic and predicate logic and is able to conduct formal proofs. Such knowledge and skills can be obtained by following the course 2IT60 Logic and Set Theory.
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Content and composition

Computer Science is a field that studies the theory of computation and its applications. These applications can be found everywhere, ranging from little apps on your phone and embedded software in your TV to large software systems coordinating complex machinery or managing lots of data. This package brings together three courses that provide the essentials for you to start writing your own software. The course Applied Logic is about the concepts, ideas, methods, and results that are fundamental to informatics as a science. The Data Structures course focuses on algorithms and data structures to solve computational problems efficiently. In the course Data modeling and databases, you learn about the design of information systems to store and retrieve data (this course may be used as a replacement if you took one of the other courses).

Course code	Course name	Level classification
2ITX0	Applied Logic	-
2IL50	Datastructures	-
2ID50	Data modeling & Databases	-

Course description

Applied Logic (2ITX0)
In this course, you learn how to apply logic to solve a wide range of problems, including the verification of programs with the assistance of an SMT-solver. It is also discussed how to prove the correctness of a program by means of so-called invariants as well as how to design programs from a given invariant. In addition, the basic principles of information theory, including compression, error control, and cryptography are treated.

Datastructures (2IL50)
For solving algorithmic problems many aspects need to be mastered: efficient ways of storing and manipulating data, algorithm design techniques, how to establish that an algorithm is correct, and how to analyze the efficiency of an algorithm. In this course, the student will learn the basic skills and knowledge to develop efficient algorithms to solve computational problems and to make informed choices between different solutions for the same problem. These include standard data structures and algorithms for frequently appearing problems.

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Data modeling & Databases (2ID50)

This course teaches students to design the structure of information systems. With "design" we mean that the students learn to translate a natural language description of a business' information needs into a data model, expressed in the entity relationship model. Students must be capable of translating that model into a relational database structure. They must be able to optimize this structure by means of constraints and decomposition algorithms. Students also must become fluent in query languages, in order to express natural language questions in query languages, and in order to express queries in natural language.