Introduction to Computer Science for Engineers

Winter

(in German: Introduction to Computer Science for Engineers)

Module-ID: FIN-INF-120440

Abbreviation	Credit Points	Semester	Term	Duration	Language	Level
ICSE	6	Winter	starting at 1.	1 Semester	english	Bachelor

Link:	LSF
Limited accessability:	
Responsibility:	Dr. Christian Braune
Lecturer:	Dr. Christian Braune
Classes:	• Lecture *Introduction to Computer Science for Engineers* • Exercise class *Introduction to Computer Science for Engineers*
Applicability in curriculum:	- M.Sc. DE: Grundlagen Informatik - M.Sc. DE: Informatik Grundlagen (SPO 2027)

Intended learning outcomes:
Students who finish this course

- know the basic principles of programming in an imperative, object-oriented programming language
- understand that design of an algorithm can impact its runtime

- know some of the most commonly used data structures and what their respective advantages and disadvantages are

Content:
Introduction to:

- imperative programming paradigm
- basic concepts of object-oriented programming
- programming in a commonly used programming language (e.g. Python)
- generic programming
- fundamental data structures:
  - trees (binary trees, search-trees and self-balancing search trees)
  - hash tables
  - graphs
- abstract data types: lists, stacks, queues
- main algorithms for fundamental tasks such as sorting and searching
- methods to observe algorithm complexity or performance (Big-O notation).
- fundamental types of algorithm design paradigms: Divide-and-Conquer, Greedy, Backtracking and Searching, and Dynamic Programming

Workload:
180 h (70 h contact hours + 110 h complementary reading and realization of the exercises/assignments)

Pre-examination requirements:	Type of examination:	Teaching method / lecture hours per week (SWS):
Prerequisites for admission: successful completion of assignments (voting & assessment). Details will be explained during the first lecture.	Written examination, 120 min	Lecture (2 SWS) Exercise (2 SWS)

Prerequisites according to examination regulations:	Recommended prerequisites:
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Media:	Literature:
	Computer Science - An Interdisciplinary Approach, R. Sedgewick and K. Wayne, Addison-Wesley, 2016, ISBN 0-13-407642-7 Algorithms, 4th Edition, R. Sedgewick and K. Wayne, Addison-Wesley, 2011, ISBN 0-321-57351-X Data Structures and Algorithm in Java, 6th Edition, M.T. Goodrich and R. Tamassia and M.H. Goldwasser, Wiley, 2014, ISBN 1-118-77133-4

Comments:

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