COURSE DETAIL

COMPUTABILITY AND COMPLEXITY

Country Denmark

Host Institution University of Copenhagen

Program(s) University of Copenhagen

UCEAP Course Level Upper Division

UCEAP Subject Area(s) Computer Science

UCEAP Course Number 157

UCEAP Course Suffix

UCEAP Official Title COMPUTABILITY AND COMPLEXITY

UCEAP Transcript Title COMPUTABILITY

UCEAP Quarter Units 6.00

UCEAP Semester Units 4.00

Course Description

In computing, there is continual tension between time usage and space usage, and what can be computed and what cannot be computed at all. The purpose of this course is to explore these issues. Topics covered include: regular languages; context-free language; Turing machines; decidability; reducibility; complexity; complexity classes (P, NP, PSPACE, EXPSPACE, L, and NL); intractability. Also covered in this course are: computational models such as finite automata, pushdown automata, and Turing machines, the languages recognized by some of these models, and techniques for showing their limitations, such as the pumping lemmas for regular and for context-free languages; the power and limits of algorithmic solvability, with focus on the computationally unsolvable Halting problem; the reducibility method for proving that additional problems are computationally unsolvable; how to analyze algorithms and their time and space complexity and how to classify problems according to the amount of time and space required to solve them; known computational problems that are solvable in principle but not in practice, i.e., intractable problems. Students obtain the following skills; reading and writing specifications of languages using computational models and grammars; classifying given languages according to type (regular, context-free, etc.) and algorithmic problems according to complexity (time and space); showing the equivalence between certain machine models; presenting the relevant constructions and proofs in writing, using precise terminology and an appropriate level of technical detail. Prerequisites: Basic algorithms and discrete mathematics course(s).

Language(s) of Instruction English

Host Institution Course Number NDAA09007U

Host Institution Course Title COMPUTABILITY AND COMPLEXITY

Host Institution Campus Science

Host Institution Faculty

Host Institution Degree

Host Institution Department

Computer Science

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