THEORY OF COMPUTATION

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INTENDED AUDIENCE: Computer Science undergraduate students.
PRE-REQUISITES: It is recommended that the candidate has done a course in Data Structures and Algorithms.
INDUSTRY SUPPORT: Content will be updated soon

COURSE OUTLINE :
This is an introductory course on Theory of Computation intended for undergraduate students in computer science. In this course we will introduce various models of computation and study their power and limitations. We will also explore the properties of the corresponding language classes defined by these models and the relations between them. We will assume the student is comfortable in analytical reasoning and has preferably done a course on Data Structures and Algorithms.

ABOUT INSTRUCTOR :
Prof. Raghunath Tewari is an Associate Professor in the department of Computer Science and Engineering at IIT Kanpur. His research interests lie in the areas of computational complexity theory, algorithms and graph theory.

COURSE PLAN :

Week 1: Finite Automata – deterministic and nondeterministic, regular operations

Week 2: Regular Expression, Equivalence of DFA, NFA and REs, closure properties

Week 3: Non regular languages and pumping lemma, DFA Minimization,

Week 4: CFGs, Chomsky Normal Form

Week 5: Non CFLs and pumping lemma for CFLs, PDAs, Equivalence of PDA and CFG

Week 6: Properties of CFLs, DCFLs, Turing Machines and its variants

Week 7: Configuration graph, closure properties of decidable languages, decidability properties of regular languages and CFLs

Week 8: Undecidability, reductions, Rice's Theorem, introduction to complexity theory