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. Ragunath Tewari is an Assistant Professor in the department of Computer Science and Engineering at the Indian Institute of Technology, Kanpur. His primary research interest is in the area of computational complexity theory. Dr. Tewari did his B.Sc. from Chennai Mathematical Institute in 2005 and Ph.D. from University of Nebraska-Lincoln in 2011.

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, introducti