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## CSE 431 Introduction to Theory of Computation

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### **Credits**

3.0 (3 hrs. lecture)

### **Lead Instructor**

Anup Rao

### **Textbook**

- *Computational Complexity*, Arora

### **Course Description**

Models of computation, computable and noncomputable functions, space and time complexity, tractable and intractable functions.

### **Prerequisites**

either CSE 312 or CSE 322.

### **CE Major Status**

Selected Elective

### **Course Objectives**

Develop the concepts and skills necessary to be able to evaluate the computability and complexity of practical computational problems.

### **ABET Outcomes**

(a) an ability to apply knowledge of mathematics, science, and engineering

### **Course Topics**

- Turing machines (deterministic, nondeterministic, multitape)
- Church-Turing Thesis
- Decidability and undecidability, diagonalization, and reducibility
- Halting problem, Post correspondence problem, Rice's Theorem, and other undecidability results
- Time and space complexity
- P vs. NP, NP-completeness, Cook's Theorem, and other NP-complete problems
- PSPACE, PSPACE-completeness, PSPACE-complete problems
- L vs. NL, NL-completeness, Savitch's Theorem, Immerman-Szelepcsényi Theorem