Dept Number	CS 451	Course Title	Theory of Computing
Semester Hours	3	Course Coordinator SP15	Shahram Rahimi
Catalog Description		The fundamental concepts of the theory of computation including finite state acceptors, formal grammars, Turing machines, and recursive functions. The relationship between grammars and machines with emphasis on regular expressions and context-free languages.	

Textbooks

Machines, Languages and Computation. Denning, Peter J., Jack B. Dennis and Joseph E. Qualitz. Prentice Hall, 1978. ISBN: 9780135422588.

References

Course Learning Outcomes

- Understand the fundamental concepts of the theory of computation including finite state machines, formal grammars and languages, Turing machines and recursive functions.

- To learn the relationships between grammars and machines.

- To learn the general properties of formal languages with an emphasis on regular expressions and context free languages.

Assessment of the Contribution to Student Outcomes

Outcome →	1	2	3	4	5	6	7	8	9	10
Assessed →	X	X								

Prerequisites by Topic

CS 311 and 330 each with a grade of *C* or better or graduate standing.

Major Topics Covered in the Course

1. Review of mathematical preliminaries {3 classes}

2. Abstract machines and languages: formal grammars; the four types of phase structured grammars; derivation of sentences; ambiguity {6 classes}

3. Properties of finite state machines, equivalence, reduction. {6 classes}

4. Finite state acceptors, regular grammars, regular expressions, properties of finite state languages {6 classes}

5. Limitations of finite automata, automata with tape {2 classes}

6. Pushdown automata, context free grammars {6 classes}

7. Context free languages, canonical forms, closure properties {7 classes}

8. Turing machines, effective computability, recursive functions {4 classes}