

## COURSE DESCRIPTION

**Department and Course Number:** CSCI 311

**Course Title:** Models of Computation

**Current Catalog Description:** Introduction to the theoretical foundations of computer science, including automata and formal languages.

**Total Credits:** 3 hours

**Coordinator:** H. Conrad Cunningham, Associate Professor of Computer and Information Science

**Textbook:** Peter Linz. *An Introduction to Formal Languages and Automata*, Third Edition, Jones and Bartlett Publishers, 2001.

**References:** <http://www.cs.olemiss.edu/~hcc/csci311/>

**Course Goals:** This course gives students an introduction to the theoretical foundations of computer science, which include topics such as automata, formal languages, Turing machines, and computability. The course also examines how these theoretical topics are closely associated with practical issues such as compiler construction and programming language design.

**Prerequisites by Topic:**

1. Basic discrete mathematics (MATH 301)
2. Basic data structures and algorithms (CSCI 112)

**Major Topics Covered in the Course:**

1. Introduction (2 hours)
2. Finite automata (6 hours)
3. Regular languages (6 hours)
4. Context-free languages (6 hours)
5. Normal forms (4 hours)
6. Pushdown automata (3 hours)
7. Context-free languages (3 hours)
8. Turing machines (6 hours)
9. Languages (2 hours)
10. Computability (2 hours)
11. Exams (5 hours)

**Laboratory Projects:** There are approximately nine homework assignments that involve constructions of automata (finite, pushdown, Turing machines), formal languages, or grammars and a few proofs. Students have 1 to 1.5 weeks to complete each assignment.

**Estimate of ABET/CAC Category Content:**

	CORE	ADVANCED		CORE	ADVANCED
Data Structures	_____	_____	Computer Organization and Architecture	_____	_____
Algorithms	_____	_____	Concepts of Programming Languages	_____	_____
Software Design	_____	_____	Theoretical Foundations	<u>  3  </u>	_____

**Theoretical Content (Foundations):** Almost all the topics covered in this semester-long, three hour per week course concern the theoretical foundations of computing science.

**Problem Analysis:** Most of the homework exercises require each student to understand a formalism and a given problem and to construct a formal structure (automaton, grammar, language) that solves the problem.