



CSCI 340: Computational Models

Background

Department of Computer Science

The Theory of Computers

- Form mathematical models that will describe
 - parts of computers
 - types of computers
 - and similar machines
 - ... with varying degrees of accuracy
- Mathematical doesn't necessarily mean geometry or calculus
- Make claims and support them with logic and **proofs**
- The material in this class is timeless – it carries through general theory of computation. Agnostic to:
 - computer architecture
 - programming language
 - operating system

The Building Blocks of Theory of Computation

- Mathematical Logic
- Set Theory
- Mathematical Proofs
- Universal Algorithm Machine
 - Alonzo Church
 - Stephen Kleene
 - Emil Post
 - Andre Markov
 - John Von Neumann
 - Alan Turing

Why is Theory of Computation Important?

- ① Because Prof. Killian says it is
- ② Because MU CS says it is
- ③ Because computer science is built on mathematics?

Why is Theory of Computation Important?

- ① We want to prove proofs in mathematics
- ② We want to use mathematics to describe how things work
 - Theory of Computation: modeling **algorithms**
 - “Neural Networks”: modeling **thought**
- ③ We want to understand how computers work from a rigorous logical view rather than from details (See CSCI 362, 370, 380)

Computer Theory

- **Three Primary Components:**
 - Theory of Automata
 - Theory of Formal Languages
 - Theory of Turing Machines
- **General Overview of the Course:**
 - Analyzing different types of theoretical machines
 - Describing these theoretical machines as mathematical models
 - Determine their strengths and weaknesses
 - Discover the concept of *computability*

Grading

- 15% – Test 1
- 15% – Test 2
- 15% – Test 3
- 15% – Test 4
- 15% – Homework Assignments
- 25% – Laboratory Assignments

≥ 93	≥ 90	≥ 87	≥ 83	≥ 80	≥ 77	≥ 73	≥ 70	≥ 67	≥ 63	≥ 60	< 60
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

You must attempt all exams, homeworks, and labs to pass the course

Homework and Laboratory Assignments

- **Homework (15% of grade)**
 - Handed out Tuesday of each week
 - Due the immediately following Sunday @ 11:59PM
 - Submitted through D2L or Autolab
 - Approximately 10 throughout the semester

- **Laboratory Assignments (25% of grade)**
 - Five throughout the semester (5% each)
 - Computer-based assignments with JFLAP or other programs
 - **autograded** using <http://autolab.millersville.edu>