CS 3613: Theoretical Foundations of Computing **Spring 2009**
Course Outline (Tentative) (Last Revised on January 11, 2009)

---

1. Mathematical Preliminaries and Introductory Material
   Source: Lecture Notes, and [Sip06] Chapter 0

2. Regular Languages: Finite Automata (FAs) and Regular Expressions
   Source: Lecture Notes, and [Sip06] Chapter 1
   2.1 Deterministic Finite Automata (DFAs); and Nondeterministic Finite Automata (NFAs)
   2.2 The Equivalence of DFAs and NFAs
   2.3 Regular Expressions and Regular Languages
   2.4 The Equivalence of Regular Expressions and Finite Automata
   2.5 The Pumping Lemma for Regular Languages

3. Context-Free Languages: Context-Free Grammars (CFGs) and Pushdown Automata (PDAs)
   Source: Lecture Notes, and [Sip06] Chapter 2
   3.1 CFGs and Context-Free Languages (CFLs)
   3.2 PDAs
   3.3 The Equivalence of CFGs and PDAs
   3.4 The Pumping Lemma for CFLs

4. Computability
   Source: Lecture Notes, and [Sip06] Chapters 3 and 4 (and 5, if time permits)
   4.1 Turing Machines (TMs); and Their Variations
   4.2 The Church-Turing Thesis
   4.3 Introductory Computability/Decidability
   4.4 Reducibility