Department Of Computer Science and Engineering
Kathmandu University
Dhulikhel, Kavre

Subject: Theory of Computation **Course: COMP 316**

Level: B.Sc 3rd Year 1st Semester **Credit Hours: 3**

Course Objective:

To understand the mathematical model of computers: DFA, NFA, CFG, Pushdown Automata, Turing Machines, Notions of Computability and undecidability

SYLLABUS

Unit 1:

1. Deterministic and Non-Deterministic Finite States Machines, Equivalence between NFA and DFA **6 hrs**
2. Regular Expressions and their properties, the relationship between DFA and regular expression, pumping lemma, algorithms for minimizing finite-state machines **5 Hrs**

Unit 2:

1. Context-Free Grammar (CFG), properties, closure properties, languages and automata, languages that are not context-free, ambiguous languages **6 hrs**
2. Push down automata, deterministic and non-deterministic PDA, the relationship between CFG and PDA **5 Hrs**
3. Undecidability, post-correspondence problem, several examples of undecidable problems

7 Hrs

Unit 3:

1. Turing machines, computation by Turing machines, extensions of Turing machines, Turing enumerable languages **5 Hrs**
2. The Church-Turing thesis, Universal Turing Machines, halting problems **6 Hrs**
3. Computational complexity, Class P, Class NP, intractable problems, NP-complete problems **5 Hrs**

TEXTBOOKS:

1. Introduction to Automata Theory, Languages and Computation by Hopcroft, Motwani and Ullman

Reference Book:

1. Computer Organization and Architecture (4th ed.): Designing for performance, Prentice-Hall, Inc. Upper Saddle River, NJ, USA ©1996, ISBN:0-13-359985-X