Course Title and Code	CS224– Compiler Design

I. Course Identification and General Information:

Course Title	Compiler Design	Course Code	CS224	Pre-requisite	CS213
Department	Computer Science	Course Level	6	Credit Hours	3(3+0)

II. Course Description/Topics: The following course topics will be covered.

- Compiler introduction and background. Phases and cousins of compiler
- Lexical analysis: regular expressions, finite automata and its implementation.
- Syntax analysis: top-down and bottom up parsing. Derivation trees. Writing context-free grammar of a sample computer language. Recursive descent parsing. LL parsing. Non-recursive predictive parsing. SLR parsing.
- Syntax-directed translation. S-attributed and L-attributed grammars. Abstract syntax trees.
- Semantic analysis. Type checking.
- Runtime environments. Activation trees, activation records, calling sequence.
- Intermediate code generation. Three-address code. Flow-of-control statements translation.
- Code generation and optimization.Register allocation, basic block and peephole optimizations.

III. Course Outcomes: Summary of the main learning outcomes for students enrolled in the course.

- Identify the actual role of compiler in a language processing system.
- Distinguish syntax and parsing from semantics and implementation.
- Use formal grammars to specify the syntax of languages.
- Identify key issues in syntax: ambiguity, associativity, precedence.
- Applying data structures to various algorithms in the design of compiler phases.
- Describe semantic analysis using an attribute grammar.
- Implementing context sensitive, static analysis type checker for programming language constructs.
- Identify and fix memory leaks and dangling-pointer dereferences.
- Identify necessary steps for automatically converting code to assembly language.
- Generate the low-level code for assignment and flow of control statements.
- Analyze computer code for correctness and efficiency.

IV. Required Text:

- Compilers: Principles, techniques and tools. Aho, Lam, Sethi and Ullman.

V. References:

- Introduction to Compiler Design. T. Mogensen.