| Dept Number | CS 516 | Course Title | Advanced Compilers |
|---|---|---|---|
| Semester Hours | 3 | Course Coordinator | Henry Hexmoor |
| Catalog Description | A continuation of 416 including advanced topics in lexical and syntax analysis, error recovery, semantic analysis, code optimization, and compiler compilers. | | |

**Textbooks**

**References**

**Course Learning Outcomes**

**Assessment of the Contribution to Program Outcomes**

| Outcome → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Assessed → | X | X | X | | X | | X | | | |

**Prerequisites by Topic**

CS 416



**Major Topics Covered in the Course**

1. Lexical Analysis

   Some sophisticated pattern matching algorithms and their optimization. Use of LEX.
2. Error Recovery

   Detection, reporting, recovery and repair of errors in the compilation process.
3. Syntax Analysis

   Cannonical LR parsers, handling of ambiguous grammars, error reporting in LL(1), operator precedence and LR parsing, efficient generation of LALR(1) sets, optimization of LR parsers, optimization of transformations.
4. Run Time Storage

   Activation records, handling recursive calls, management of variable length blocks, garbage collection and compaction
5. Type Checking

   Overloading of functions and operators, polymorphic functions, unification algorithm.
6. Code Generation and Semantic Analysis

   Semantic stacks, attributed translation, analysis of syntax directed translation.
7. Code Optimization

   Basic blocks and folding, optimization within iterative loops, global optimization through flowgraph analysis, code improving transformations, Machine dependent optimization.
8. Compiler-Compilers

   Parser generators, YACC, attributed LL(1) parser generator, machine independent code generation.
9. Other Topics

   COMPILERS for parallel machines, compilers for functional languages.