

# Course Outline

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## 1. Document Information

<b>Degree Program</b>	Computer Science
<b>Course Number</b>	CS 516
<b>Course Title</b>	Advanced Compilers
<b>Semester Hours</b>	3
<b>Course Coordinator</b>	Henry Hexmoor
<b>Revision Term</b>	Spring 2021
<b>Latest Revision</b>	Spring 2021

## 2. Catalog Description

A continuation of 416 including advanced topics in lexical and syntax analysis, error recovery, semantic analysis, code optimization, and compiler compilers.

## 3. Textbooks

## 4. References

## 5. Course Learning Outcomes

## 6. Assessment of the Contribution to Student Outcomes

Outcome	1	2	3	4	5	6	7
Assessed	X	X	X		X		X

## 7. Prerequisites by Topic

CS 416

## 8. 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  
Canonical 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.