

- Gross structure of compilers - tasks of front/middle/back ends
 - 17 Q6
- Basic notions of grammars - productions, terminals, non-terminals
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- Regular expressions and DFAs:
 - Standard regular expression operators
 - Writing regular expressions to generate specific languages
 - 15 Q1, 17 Q1, 18au Q1, 21 Q1
 - Constructing DFAs to recognize regular languages (but you are not responsible for the detailed RE → NFA → DFA → RE construction algorithms)
 - 15 Q2, 17 Q1, 18au Q1, 21 Q1
 - Analyzing regular expressions and DFAs to determine which languages (sets of strings) they accept
 - 19 Q2
- Scanners - transforming character streams to token streams, principle of longest match, etc.
 - 15 Q3, 17 Q2, 18au Q2
- Context-free grammars:
 - Derivations, leftmost, rightmost, parse trees, etc.
 - Constructing grammars to generate languages
 - 18au Q4
 - Ambiguity
 - 15 Q5, 17 Q3, 18au Q3, 21 Q2
 - FIRST, FOLLOW, and nullable
 - 17 Q4, 18au Q5, 21 Q3
- LR parsing:
 - Shift-reduce parsing
 - Construction of LR(0) and SLR parsers and tables
 - 15 Q4, 17 Q4, 18au Q5, 21 Q3
 - Items, item sets, and parser states
 - Shift-reduce and reduce-reduce conflicts and how to deal with them
 - <https://courses.cs.washington.edu/courses/cse401/22sp/lectures/D-lr-parsing.pdf>
 - Differences between LR(0) and SLR parsers
- LL and recursive-descent parsers:
 - Predictive parser operation and grammar requirements (disjoint first sets)
 - Is this LL(1)?, 19 Q5, 18au Q6, 18sp Q5, 17Q5, 15 Q7, 21 Q4

- Constructing hand-written recursive-descent parsers
 - 15Q7?
- Grammar problems and fixes for LL parsing - left recursion, left-factoring common prefixes, etc.
 - 18au Q6, 17 Q5, 15 Q7
- Abstract Syntax Trees (ASTs) and the visitor pattern
 - 19 Q6, 15 Q6
- Compiler project phases that have been completed so far (scanner, parser, AST/visitor). Do not memorize detailed information; reference information will be provided if needed to answer specific questions.
 - Overview: 17Q6
 - Scanner: 18au Q2, 18sp Q2, 17Q2, 15Q3
 - Parser/Visitor (P501): 19au Q5, 18SP Q5,
- Static semantics: There may be some basic overview questions on these concepts based on lectures, but the midterm will not include details that won't be encountered until the next phase of the project.
 - Typical kinds of conditions that are tested/verified in the semantics pass
 - 19 Q6, 18au Q7, 18sp Q6, 15Q6
 - Organizing semantic analysis based on abstract grammars (ASTs)
 - 19 Q6, 18au Q7, 18sp Q6, 15Q6
 - Attribute grammar general concepts
 - <https://courses.cs.washington.edu/courses/cse401/22sp/lectures/l-semantics.pdf> l-22
 - General symbol table organization and representation of type information for languages like MiniJava
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