

## COURSE SYLLABUS

*Note: This syllabus is tentative. It will be updated throughout the rest of the term to incorporate additional readings and indicate our actual progress.*

### **Tue. Sep. 5: Lecture 1 – Course Overview**

*Topics:* What is a compiler? Compilers vs. Interpreters. Stages of a compiler. Administrivia

### **Fri. Sep. 8: Lecture 2 – Abstract Syntax and Interpretation**

*Topics:* Concrete and abstract syntax. Grammars. ML datatype representation of grammars. Interpretation. Example: SLiP (Appel's straight-line programming language)  
*Out:* PS1 (KITTY interpreter)

### **Tue. Sep. 12: Lecture 3 – Automata Theory**

*Topics:* Introduction to lexical analysis. Overview of automata theory: Deterministic finite automata, nondeterministic finite automata, regular expressions, regular grammars

### **Fri. Sep. 15: Lecture 4 – ML-Lex**

*Topics:* ML-Lex, a scanner generator.  
*Due:* PS1 (KITTY interpreter, Part 1)  
*Out:* PS2 (KITTY scanner)

**Tue. Sep. 19 – No class ; Lyn away at a conference.**

**Fri. Sep. 22 – No class ; Lyn away at a conference.**

### **Tue. Sep. 26: Lecture 5 – Simple Parsing**

*Topics:* Recursive descent parsing. Backtracking.  
*Due:* PS1 (KITTY interpreter, Part 2)

### **Fri. Sep. 29: Lecture 6 – Monadic Parsing**

*Due:* PS2 (KITTY scanner)  
*Out:* PS3 (KITTY monadic parser)

### **Tue. Oct. 3: Lecture 7 – MIPS assembly language**

### **Fri. Oct. 6: Lecture 8 – Compiling to Assembly Language**

*Due:* PS3 (KITTY monadic parser)  
*Out:* PS4 (KITTY/MIPS back end)

**Tue. Oct. 10: No Class -- Fall break**

**Fri. Oct. 13: Lecture 9 -- Type Checking**

*Topics:* The BOBCAT language, type checking  
*Out:* PS5 (BOBCAT type checker)

**Tue. Oct. 17: Lecture 10 – LL Parsing**

*Topics:* Predictive parsing. First and follow sets. LL(k) parsing.

**Fri. Oct. 20: Lecture 11 – Simple LR (SLR) Parsing**

*Due:* PS4 (KITTY/MIPS back end)

**Tue. Oct. 24: Lecture 12 – LALR Parsing**

**Fri. Oct. 27: Lecture 13 – ML-Yacc**

*Topics:* ML-Yacc: A parser generator  
*Due:* PS5 (BOBCAT type checker)  
*Out:* PS6 (BOBCAT parser)

**Tue. Oct. 31: Lecture 14 – Compiling Function Calls**

*Topics:* Activation records, registers vs. stacks, caller saves vs. callee saves

**Fri. Nov. 3: Lecture 15 – Intermediate Representation (IR) Trees**

*Due:* PS6 (BOBCAT parser)  
*Out:* PS7 (BOBCAT/MIPS back end)

**Tue. Nov. 7: Lecture 16 – Compiling Compound Data**

*Topics:* Arrays and records in COUGAR. Data layout. Heap allocation.

**Fri. Nov. 10: Lecture 17 -- Basic Blocks**

*Due:* PS7 (BOBCAT/MIPS back end)  
*Out:* PS8 (COUGAR front end)

**Tue. Nov. 14: Lecture 18 – Control Flow Analysis**

**Fri. Nov. 17: Lecture 19 – Data Flow Analysis/Liveness**

*Due:* PS8 (COUGAR front end)  
*Out:* PS9 (COUGAR back end)

**Tue. Nov. 21: Lecture 20 – Register Allocation**

**Fri. Nov. 24: No class- Thanksgiving break**

**Tue. Nov. 28: Lecture 21 – Semantic Analysis**

**Fri. Dec. 1: Lecture 22 – Instruction Scheduling**

*Due:* PS9 (COUGAR back end)

*Out:* PS10 (TIGER compiler)

**Tue. Dec. 5: Lecture 23 -- Compiling to CISC machines**

**Fri. Dec. 8: Lecture 24 – To Be Announced**

*Due:* PS10 (TIGER compiler)

**There will be no final exam in CS301!**