Syllabus

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Full Syllabus

This is a course in formal (logically rigorous) concepts, tools, and methods in software engineering and languages. It is suitable for upper division undergraduates and graduate students in computer science and engineering.

Instructor: Kevin Sullivan

Meeting times and place: Tuesdays and Thursdays,, 2:00 - 3:15, Olsson 009.

Office Hours: Tuesday and Thursday, 3:15 - 4:30 (right after class each day), Wednesday 11 - 12.

Textbook: Pierce et al., *Software Foundations* (draft version), Volumes 1 and 2.

Additional readings: To be assigned in class, and posted on Collab.

Difficulty: This is an advanced undergraduate and graduate-level course. Students should expect to spend 6-9 hours of hard, independent work outside of class each week. The course requires rigorous computational as well as logical thinking, including functional programming, proof methods, properties and relations, language syntax and semantics, and type systems.

Grading: Grading will be based on weekly homeworks involving the completion of problems in the textbook, on three mid-term exams, and on a final exam. The mid-term exams will be given in class. The final will be take outside of class and will be due at 5PM on the final day of the University's final exam period. The mid-terms exam dates are September 21, October 19, and November 7. Homework assignments are due each week by the start of class on Tuesday unless otherwise indicated in class by the instructor. Homework will count for 40% of the final grade. Midterms will count 10% each. The final will count for 30%. The instructor may give occasional short quizzes in class, which will count as part of the overall homework grade.

Undergraduate vs Graduate: This is a combined advanced undergraduate and graduate course. Undergraduate student are required to complete all 1, 2, 3, and 4 star exercises within the assigned chapters and sections. Graduate students are additionally required to complete all 5 star exercises within the assigned chapters and sections except as indicated by the instructor. Some exams will include additional problems for graduate students.

Collaboration Policy: All exams are strictly individual evaluations. No collaboration or communication of any kind between students and anyone else other than the instructor or TA is permitted on exams. As for homework, students are permitted and encouraged to discuss

concepts, mechanisms, and methods. That said, every student is strongly advised that the only way to really learn the material in this course is to work the problems oneself. Students are thus strongly advised to get as much done individually as possible and to seek help only when truly stuck. Failure to follow this approach is likely to result is poor performance on individual evaluations, i.e., on exams, which are worth more than homeworks in the calculation of final grades.

Schedule:

- August 22 - September 19: Function programming and proof engineering; Chapters *Basics* through *Rel*
- September 21: Exam 1
- September 26 - October 17: Imperative language basics, including Hoare Logic; Chapters *Imp* through *Hoare II*
- October 19: Exam 2
- October 24 - November 2: Simply typed lambda calculus; Chapters *SmallStep* through *MoreSTLC*
- November 7: Exam 3
- November 9 - December 5: Type checking; Chapters *TypeChecking, References, Sub, Records, RecordSub*