CS-6620 – Section 001
Compilers
http://matthewbdwyer.github.io/6620
Tue/Thu, 15:30-16:45AM, Mech. Eng. 339

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Office Hours: Mon. 14:00-15:00 or by appointment.

Course Description: This is a graduate course on compilers. The particular focus of this course will be on static program analysis. The course goals are for students to (a) learn foundational concepts in program analysis, (b) put those concepts into practice in the small "controlled" setting of an existing compiler, (c) learn how those concepts work at scale in a production compiler, and (d) explore recent research that has impacted production compilers.

The course blends the theory and algorithms with practical aspects of engineering compilers – specifically program analyses. It adopts a constraint-based approach to program analyses, e.g., inclusion constraints for type checking, systems of equations for data flow analysis, and frames program analysis as the combination of (1) constraint generation from program representations and (2) computing analysis results by applying generic constraint solving engines.

The course will also explore how compilers exploit program analysis results, e.g., to improve code quality, to identify faults, etc.

To get the most out of the course students should be mature programmers who are comfortable developing working skills with a new programming language, able to explore and use complex APIs and digest them despite incomplete documentation, and to learn new tools and techniques without significant guidance.

Prerequisite(s): undergraduate course on programming languages or compilers, or equivalent experience, or permission of the instructor.

Credit hours: 3

Requirement Designation: Software Systems Area

Text(s): No textbook is required. Instructor will provide links to lecture notes and readings.

Assignments and Grading Percentages

Homeworks: 42%
Pass analysis: 12%
Project: 46%

Letter Grade Cutoffs

A+ [98,-], A [94,98), A- [90,93), B+ [87,90), B [83,87), B- [80,83), C+ [77,80), C [73,77), C- [70,73), D+ [67,70), D [63,67), D- [60,63), F [-,60)

Course Policies

- Students must comply with the University Honor Code (see below)
- Assignments in this course can be solved by pairs of students, but discussion of solutions and sharing of information across pairs of students is not permitted and is considered an Honor Code violation.
- There is no teaching assistant. Students may freely discuss questions related to using various tools, such as, sbt, scala, antlr4, llvm, intelliJ, etc., in the course. They are encouraged to do so and to share with others – this type of collaboration will not be considered an honor code violation.
- Late assignments will not receive a grade.
- Cell phone usage in class is not permitted.
- Laptops may only be used for class purposes.

Academic Integrity

The School of Engineering and Applied Science relies upon and cherishes its community of trust. We firmly endorse, uphold, and embrace the University's Honor principle that students will not lie, cheat, or steal, nor shall they tolerate those who do. We recognize that even one honor infraction can destroy an exemplary reputation that has taken years to build. Acting in a manner consistent with the principles of honor will benefit every member of the community both while enrolled in the Engineering School and in the future.

Students are expected to be familiar with the university honor code, including the section on academic fraud. Each assignment will describe allowed collaborations, and deviations from these will be considered Honor violations. If you are in doubt regarding the requirements, please consult with me before you complete any requirement of this course. Send, receiving or otherwise copying electronic files that are part of course assignments are not allowed collaborations (except for those explicitly allowed in assignment instructions).

Assignments where honor infractions or prohibited collaborations occur will receive a zero grade for that entire assignment or exam, as well as a full letter-grade penalty on the course grade. Such infractions will also be submitted to the Honor Committee if that is appropriate. Students who have had prohibited collaborations may not be allowed to work with partners on remaining homeworks.

SDAC and Other Special Circumstances

The University of Virginia strives to provide accessibility to all students. If you require an accommodation to fully access this course, please contact the Student Disability Access Center (SDAC) at 434-243-5180 or sdac@virginia.edu. If you are unsure if you require an accommodation, or to learn more about their services, you may contact the SDAC at the number above or by visiting their website at URL.

If you have been identified as an SDAC student, please let the Center know you are taking this class. If you suspect you should be an SDAC student, please schedule an appointment with them for an evaluation. Students who need academic accommodations should see me and contact the SDAC. All academic accommodations must be arranged through the SDAC.

If you have other special circumstances (athletics, other university-related activities, etc.) please contact instructor and/or TA as soon as you know these may affect you in class.

Religious Accommodations

It is the University's long-standing policy and practice to reasonably accommodate students so that they do not experience an adverse academic consequence when sincerely held religious beliefs or observances conflict with academic requirements. Students who wish to request academic accommodation for a religious observance should submit their request in writing directly to me by email as far in advance as possible. Students and instructors who have questions or concerns about academic accommodations for religious observance or religious beliefs may contact the University's Office for Equal Opportunity and Civil Rights (EOCR) atUVAEOCR@virginia.edu or 434-924-3200.

Accommodations do not relieve you of the responsibility for completion of any part of the coursework missed as the result of a religious observance.

Statement on Violence

The University of Virginia is dedicated to providing a safe and equitable learning environment for all students. To that end, it is vital that you know two values that I and the University hold as critically important:

Power-based personal violence will not be tolerated. Everyone has a responsibility to do their part to maintain a safe community on Grounds. If you or someone you know has been affected by power-based personal violence, more information can be found on the UVA Sexual Violence website that describes reporting options and resources available
- www.virginia.edu/sexualviolence.

As your professor and as a person, know that I care about you and your well-being and stand ready to provide support and resources as I can. As a faculty member, I am a responsible employee, which means that I am required by University policy and federal law to report what you tell me to the University's Title IX Coordinator. The Title IX Coordinator's job is to ensure

that the reporting student receives the resources and support that they need, while also reviewing the information presented to determine whether further action is necessary to ensure survivor safety and the safety of the University community. If you would rather keep this information confidential, there are Confidential Employees you can talk to on Grounds (See http://www.virginia.edu/justreportit/). The worst possible situation would be for you or your friend to remain silent when there are so many here willing and able to help.

This syllabus

This syllabus is to be considered a reference document that can and will be adjusted through the course of the semester to address changing needs. This syllabus can be changed at any time without notification. It is up to the student to monitor this page for any changes. Final authority on any decision in this course rests with the professor, not with this document