

CS522 - Programming Language Semantics

General Information and Introduction

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General Information

- Class Webpage, Piazza: <http://fsl.cs.uiuc.edu/grosu>, then Teaching, then CS522
<https://piazza.com/illinois/fall2021/cs522>
- Lectures: Tuesday/Thursday 12:30 - 13:45, Zoom
- Office hours: By appointment, 2110 Siebel Center or Zoom
- Instructor: Grigore Roşu
 - Office: 2110 Siebel Center
 - Email: grosu@illinois.edu
 - WWW: <http://fsl.cs.illinois.edu/grosu>
- Prerequisites: CS422 or instructor's approval

- Textbooks

None required! Lecture notes and/or articles will be posted on class' webpage. This class will integrate and present in a uniform format various semantic concepts that are accepted as useful/interesting the programming language community.

- Other sources

- Lean (v4): <https://leanprover.github.io/>
- Optional: Maude Language: <http://maude.cs.uiuc.edu>
- Optional: The K Framework: <http://kframework.org>
- Proceedings of Conferences on Programming Languages
 - * **POPL** (ACM Symp. on Principles of Prog. Lang.)
 - * **PLDI** (ACM Symposium on Programming Language Design and Implementation)
 - * **OOPSLA** (ACM Conference on Object Oriented Programming Systems, Languages and Applications)

Grading

Each of the following will count as shown for the final grade:

- 75% – Homework assignments (6-7 of them)
- 25% – Project.

The project can be done in teams of 2-3 people. There will be two phases, each graded separately: a mid-term phase and a final phase.

Contact me as soon as you form a team, to agree on a topic.

Collaboration and Other Policies

- You are free to discuss the homeworks and the take-home exam with other students (and are encouraged to do so!). The focus of any such discussion should be limited to figuring the problem specification, not coming up with a solution. **You are *not* allowed to write your homeworks jointly.** To do so will be considered cheating! All cheating will be penalized by automatically assigning a failing grade for the course and instigating further disciplinary action with the appropriate university disciplinary body.
- You are encouraged to **collaborate on projects**, including exchanging code. For example, those defining languages that have arrays may wish to exchange code and ideas. If several groups decide to share the same module defining a common language feature, which is considered a very good thing to do,

please also let me know.

- You should **retain copies** of your exams until you receive your final grade. Your grade may be adversely affected by an inability to explain your work or by failure to retain copies of it.
- The course has a **Piazza page**. You are encouraged to use it to ask questions, answer mundane questions for other students, discuss exams, etc. In consideration for your peers, please don't use it to post flames, irrelevant messages, ads, etc.

Course Description

- Advanced course on programming language semantics
- Major language semantics paradigms will be investigated and mathematically defined, including:
 - Various approaches to programming language semantics, such as operational, evaluation-context-based, denotational, axiomatic, and other semantics
 - λ -calculi
 - Types and type theory
 - Categorical models and category theory
 - Recursion and polymorphism
 - etc