CompSci 390: Programming Language Concepts  
Spring 2024

Description: The goal of this course is to explore fundamental principles and paradigms of programming languages. We will not focus on any one particular language, but rather we will study features found in many different languages and examine how they work and how they interact with each other. We will examine different programming paradigms, including imperative, functional, and object-oriented.

Course Objectives: The main objective is to provide an understanding of fundamental principles that underlie the design, implementation, and operation of programming languages.

Lectures: TTh, 1:25PM - 2:40PM, LSRC D106
Instructor: Professor Danfeng Zhang, LSRC D342, 919-660-6500
Office hours: Thursday. 2:40PM-4PM

Teaching Assistants:
Sixuan Dang (sixuan.dang@duke.edu)
Office hours: Tuesday and Friday 3PM-4PM @ LSRC D301

Required Textbook:
Programming Language Pragmatics (≥ 3rd edition), Michael Scott

Recommended Books:
Programming Languages, Norman Ramsey

Course Homepage:
https://courses.cs.duke.edu/spring24/compsci390/

Q&A:
https://edstem.org/us/courses/51297
Please use EdSTEM for ALL course communication. Emails will typically be slow.

Prerequisites: Computer Science 201 and 230

Assignment Policy: All assignments, written and programming, must be your own work. They must be submitted to Gradescope by midnight of the due date, unless otherwise notified.

Assignment Late Penalties: Unless otherwise specified, assignments may be turned in late with the following penalties applied to the score received:
1 day late: -20%  
2 days late: -50%  
>2 days late: -100% (we will not grade it)

Exams: 2 Midterms and 1 Final
Schedule (subject to change):

1/11   Course Intro
1/15-1/19   Functional Programming, Lambda Calculus
1/22-1/26   Encodings, Combinatory Logic
1/29-2/2   Scheme: Lists, Recursive & Higher-Order Functions
2/5-2/9   Higher-Order Functions, Sorting
2/12-2/16   Syntax
2/19-2/23   CFG and Parse Tree
2/26-3/1   Types
3/4-3/8   Type Checking and Inference
3/11-3/15   Spring Break
3/18-3/22   Procedures & Functions
3/25-3/29   Exception Handling
4/1-4/5   Program Correctness
4/8-4/12   Program Verification
4/15-4/19   Memory Management: Heaps & Garbage Collection
4/23   Wrap up

Behavior and Community Standards: All students must adhere to the [Duke Community Standard (DCS)](https://www.duke.edu). Duke University has high expectations for students’ scholarship and conduct. In accepting admission, students subscribe to and are governed by the rules and regulations of the university, which are outlined in the Duke Community Standard.

Regardless of course delivery format, it is the responsibility of all students to understand and follow all Duke policies, including academic integrity (e.g., completing one’s own work, following proper citation of sources, adhering to guidance around group work projects, and more). Ignoring these requirements is a violation of the Duke Community Standard. Any questions or concerns regarding academic integrity can be directed to the Office of Student Conduct and Community Standards at [conduct@duke.edu](mailto:conduct@duke.edu).

Mental Health and Wellness Resources: Student mental health and wellness are of primary importance at Duke, and the university offers resources to support students in managing daily stress and selfcare.

If your mental health concerns or stressful events negatively affect your daily emotional state, academic performance, or ability to participate in your daily activities, many resources are available to help you through difficult times. Duke offers several resources for all students to seek assistance and to nurture daily habits that support overall well-being, some of which are listed below:

- **DuWell** [919-681-8421](tel:919-681-8421) DuWell provides Moments of Mindfulness (stress management and resilience building) and meditation programming (Koru workshop) to assist students in developing a daily emotional well-being practice. All are welcome and no experience necessary.

- **DukeReach** DukeReach provides comprehensive outreach services to identify and support students in managing all aspects of well-being.
• **Counseling and Psychological Services (CAPS)** (919) 660-1000 CAPS services include individual and group counseling services, psychiatric services, and workshops. CAPS also provides referral to off-campus resources for specialized care.

• **TimelyCare (formerly known as Blue Devils Care)** An online platform that is a convenient, confidential, and free way for Duke students to receive 24/7 mental health support through TalkNow and scheduled counseling.