CSE216
Programming Abstractions

State University of New York, Korea

Abstraction

- A round, fluffy cat of 15 kilos with light orange and white fur
- A round, fluffy cat of 15 kilos
- A round cat
- Cat
- Animal

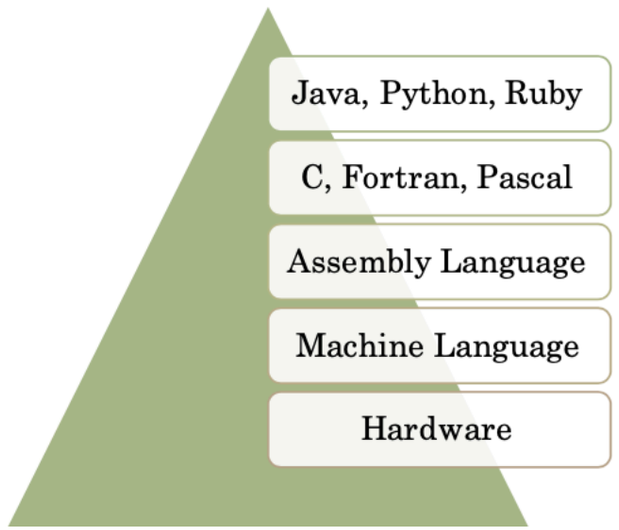
Abstraction in Software Design

- **Hide low-level implementation details**

- **Data structures, functions, and classes**

Abstraction in Language Evolution

- Most programming languages are *high-level* languages, where the phrase "high-level" indicates a higher degree of abstraction.
- The second word of this course's name – **abstraction** – is among the most important ideas in programming.
- It refers to the degree to which the language's features are separated away from the details of a particular computer's architecture and/or implementation at *lower* levels.



Why abstraction — Writing good code

We write code to solve problems. So, given a specific problem, writing good code involves

1. using the right **paradigm** for the problem,
2. using the proper amount of **abstraction, and**
3. having adequate modularity in your code.

- It allows programmers to manage the complexity of large software projects and to work collaboratively

- easier maintenance and testing of software code.

Anecdote: A project with US Defense Advanced Research Projects Agency

Non confidential part can be discussed publicly.

Project Motivation

- C memory error contribute to 85% bugs in Microsoft
- Rust language is, by design, free of most memory bugs
- *Trust* LLM to translate from C to Rust
- *But verify* the translation with state-of-the-art software techniques
- Discussed on reddit: https://www.reddit.com/r/rust/comments/1efvfrm/darpas_translating_all_c_to_rust_tractor_program/

An example of unsafe C code

```c
#include <stdio.h>

void f(int input) {
    char a[8];
    int b = 0;
    a[input] = 1;

    if (b == 0)
        printf("good\n");
    else
        printf("bad\n");
}

int main() {
    f(8);
    return 0;
}
```

This course

- **OCaml and a bit of C**. However, the course **does not solely focus on these individual programming languages**. If you approach the course with a narrow focus on the syntax of each language, you may find it more challenging than necessary.

- Instead, the course **emphasizes the underlying concepts that are common to all programming languages.**

- We examine the **programming paradigms** that have emerged. Each paradigm has its own strengths and weaknesses, and our goal is to **gain a deep understanding of the various ways of thinking about programming**. This will enable us to determine, based on a given scenario, which language and paradigm to use to write efficient and effective code.

Logistics

Course website

https://github.com/zhoulaifu/24_cse216_fall

Meet the Instructor

- Email: <zhoulai dot fu at sunykorea dot ac dot kr>
- CSE215 and CSE216
- Research Interest: Software Security
- Previous Work: France, US, Denmark and Korea
- Education: École Polytechnique, France
- Personal: Happily married; like dreaming and playing with my child; no special hobbies or talents.

TA

Young Won Choi

Email: <youngwon dot choi at stonybrook dot edu>

Team

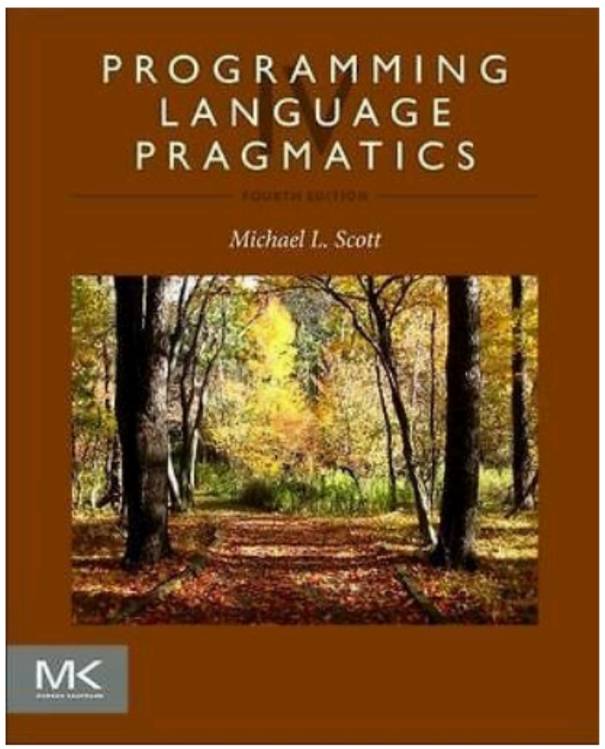
You	TA	Instructor	ChatGPT
Lectures	**Office hours**	**Office hours**	**Not do homework**
Homework	**Answer questions**	**Lectures**	**Answer questions**
Ask questions	**Grading**	**Grading**	
		Answer questions	

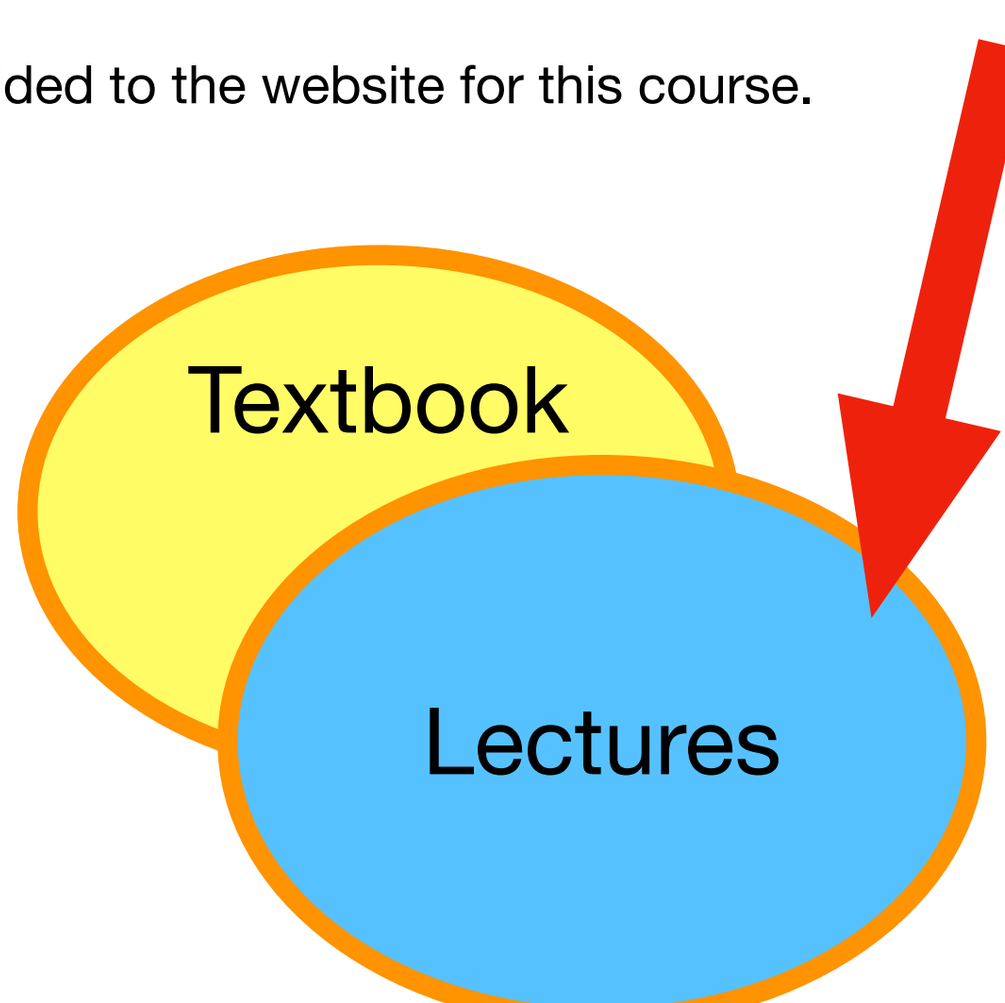
Reference books and reading material

- Michael L. Scott. Programming Language Pragmatics.

- For details pertaining to specific programming languages, the recommended material will mostly be from the following:
  Python tutorial: https://docs.python.org/3/tutorial/
  The official OCaml learning material from https://ocaml.org/learn/

- Other reading material (if used) will be added to the website for this course.





Schedule

- **Lectures:** Mondays and Wednesdays, 2:00 PM - 3:20 PM, Room B207
- **Recitation:** Monday, 3:30 PM - 4:25 PM, Room B207
- **Homework:** Announced every Wednesday, with submissions due by the following Wednesday at 11:59 PM KST.
- **Office Hours:** Mondays, 3:25 PM - 4:25 PM, and Wednesdays, 4:30 PM - 5:30 PM, Room B424.

Zoom In case

- https://stonybrook.zoom.us/j/99671076796?pwd=TGFuZ1IzSXpnSWlpMDB2a2tCRmozUT09

Numerical Grades

- Homeworks: 20%
- Midterm1: 25%
- Midterm2: 25%
- Final: 25%
- Attendance: 5%
- Bonus: Students who consistently participate or provide constructive feedback will receive a bonus of 0.5 or 1.

Letter Grades

Absolute grading will be applied:

- **A:** [93, 100]
- **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)
- **F:** [0, 63)

Definition of Force Majeure in Our Policies

Force majeure in our policies includes, but is not limited to,

- documented illness or family emergencies.

Note: A documented hospital visit alone is not sufficient to justify force majeure. The doctor's note must clearly state the reason for the absence and the recommended period of absence.

Attendance Policy

- Attendance will be checked irregularly.
- Arriving late will count as half attendance. "Late" is defined as arriving after the attendance check has been completed. After the attendance check, the TA/Instructor will mark any absences.
- Excuses are granted only in cases of force majeure. See the definition above for "force majeure."
- In the event of discrepancies between the signed attendance sheet and actual physical presence, names will be called. Students involved may be addressed privately.
- In accordance with Korean law, more than 20% absence will result in an automatic F grade.

Grading Policy

- Grading will be conducted by both the TAs and the Instructor.
- Factual errors in grades will be corrected.
- Non-factual grade disputes will not be considered.
- Plagiarism, including the use of AI-generated solutions for homework, will result in a grade of 0 and will be reported. Students involved may be addressed privately.
- Typewritten submissions are recommended; illegible handwriting may result in a grade of 0.

Late Homework Policy

- Late homework will not be accepted.
- Homeworks submitted after the deadline are only permissible in cases of force majeure. See above for the definition of "force majeure."
- Once homework solutions have been released, no submissions will be accepted under any circumstances.

Email Policy

- Please include **[CSE216]** in the subject line for all course-related email communication with the instructor.
- Use the instructor's SUNY Korea email address (see above) whenever possible.
- You can expect a reply within 72 hours. If you do not receive a response within this timeframe, kindly send a reminder.
- Emails without **[CSE216]** in the subject line may be missed.

ChatGPT Policy

We adhere to policies similar to those outlined in Stanford's Generative AI Policy Guidance.

- In general, the use of or consultation with generative AI is treated similarly to receiving assistance from another person.
- Using generative AI tools like ChatGPT to substantially complete homework assignments is not permitted.
- Students should acknowledge any use of generative AI tools (beyond incidental use) and should default to disclosing such assistance when in doubt.

Recipe for Success in CSE215

- Attend lectures
- Ask questions
- **Do homework (VITAL)**

Questions so far?

Quiz

- Where to find official course info?
- Homework due time?
- How attendance will be checked?
- How late homework will be handled?
- How to email the instructor?
- Who grade?