East China Normal University

GEC International Summer School

COMP302: Programming Languages and Paradigms

Term: June 16th to July 18th, 2025
Class Hours: Monday through Friday, 110 minutes each day (2,750 minutes in total)
Instructor: Jiangang Bai
Home Institution: Peking University
Office Hours: TBD
Email: jgbai2235@gmail.com

Course Description

In this course, we will delve into various programming paradigms, including functional programming, imperative programming, and object-oriented programming. The key concepts aims to introduce encompass procedural abstraction, where functions are treated as "first-class" citizens, data abstraction, the notion of state, object-oriented programming principles, type systems, polymorphism, and genericity. Additionally, we will explore streams and lazy evaluation, along with language processing techniques. Through theoretical discussions, practical projects, and collaborative discussions, students will gain a deep understanding of these concepts and learn how to apply them effectively in real-world programming scenarios.

Recommended Reading

- *Programming Languages: Design and Implementation (4th Edition)*, by Terrence W. Pratt, Marvin V. Zelkowitz, Pearson, 2000.

- *Programming Language Pragmatics, Third Edition,* by Michael L. Scott, Morgan Kaufmann, 2009.

Course Hours

The course has 25 class sessions in total. Each class session is 110 minutes in length, for a total of 2750 minutes of in-class time. The course meets from Monday to Friday. ECNU awards 3 credits for this course. Different universities may count course credits differently. Consult officials at your own home institution.

Attendance

Summer school is very intense and to be successful, students need to attend *every class*. Occasionally, due to illness or other unavoidable circumstance, a student may need to miss a class. ECNU policy requires a medical certificate to be excused. Any absence may impact on the student's grade. Moreover, ECNU policy is that a student who has more than 3 absences will fail the course. Arriving late or leaving early will count as a partial absence.

Grading Policy

ECNU awards grades of A, A-, B+, B, B-, C+, C, D, and F. Most colleges and universities do not award transfer credit for grades of D or F.

In this course, grading will be based on the following:

Homework	10%
Quizzes*3	15%
Programming Project	20%
Midterm	30%
Final Exam	35%

General Expectations

Students are expected to:

- Attend all classes and be responsible for all material covered in class and otherwise assigned. Any unexcused absence may impact a student's grade.
- Arrive to class on-time: Late arrivals are disruptive to your fellow students and to the conduct of the class.
- Complete the day's required reading and assignments before class.
- Review the previous day's notes before class; make notes about questions you have about the previous class or the day's reading.
- Refrain from texting, phoning or engaging in computer activities unrelated to class during class (不要用手机). It is highly disrespectful to the professor and to the class.
- Participate in class discussions and complete required written work on time.

Course Schedule

The planned schedule sketched out below may be modified to suit the interests or abilities of the enrolled students or to take advantage of special opportunities or events that may arise during the term.

Week 1

- *Day 1*
  - *Introduction to the Course*
  - *Overview of Functional Programming Paradigm*
- *Day 2*
  - *Introduction to O'Caml syntax*
  - *Procedural Abstraction and Functions*
- *Day 3*
  - *Data Abstraction in Functional Programming*
- *Day 4*
  - *Handling State in Functional Programming*
- *Day 5*

- *Tutorial/Discussion*
- *Homework*
- *Weekly Quiz 1*

Week 2

- *Day 1*
  - *Introduction to Object-Oriented Programming (OOP)*
- *Day 2*
  - *Classes and Objects in Java*
- *Day 3*
  - *Polymorphism and Inheritance*
- *Day 4*
  - *Encapsulation and Access Control*
- *Day 5*
  - *Tutorial/Discussion*
  - *Homework*
  - *Weekly Quiz 2*

Week 3

- *Day 1*
  - *Type Systems and Genericity in O'Caml*
- *Day 2*
  - *Generics in Java*

- *Day 3*
  - *Streams and Lazy Evaluation in O'Caml*
- *Day 4*
  - *Advanced Java Concepts*
- *Day 5*
  - *Tutorial/Discussion*
  - *Midterm Review Session*

Week 4

- *Day 1*
  - *Midterm*
- *Day 2*
  - *Language Processing*
- *Day 3*
  - *Lexical Analysis and Tokenization*
- *Day 4*
  - *Parsing and Syntax Analysis*
- *Day 5*
  - *Tutorial/Discussion*
  - *Homework*
  - *Weekly Quiz 3*

Week 5

- *Day 1*

  - *Semantic Analysis and Code Generation*
- *Day 2*
  - *Programming Project Presentation*
- *Day 3*
  - *Programming Project Presentation*
- *Day 4*
  - *Final Exam Review Session*
- *Day 5*
  - *Final Exam*

Academic Honesty

Students are expected to maintain high standards of academic honesty. Specifically, unless otherwise directed by the professor, students may not consult other students, books, notes, electronic devices or any other source, on examinations. Failure to abide by this may result in a zero on the examination, or even failure in the course.