



INFO 5100 – Application Engineering and Development

Spring 2024

COURSE INFORMATION

Course Number: INFO 5100

Course Title: Application Engineering and Development

Course Prerequisites: None

Term and Year: Spring 2024

Credit Hours: 4

Class Schedule: Tuesday, 3:00 pm – 6:20 pm

Course Format: In person on the Oakland campus

INSTRUCTOR INFORMATION

Instructor Name: Sergey Aityan, DSc, Ph.D.

Email Address: s.aityan@northeastern.edu

Office Hours: In person on the Oakland campus.

TEACHING ASSISTANT INFORMATION

TA Name: Ms. Kriti Sonal

Email Address: sonal.k@northeastern.edu

Office Hours: Online via Zoom or Teams in scheduled sessions and individually by appointment

COURSE DESCRIPTION

This course is an introduction to the Java Programming language with Object Oriented concepts, and an emphasis on design, engineering, and unit testing. The course covers Java development environment, major Java concepts, principles, structures, and functionality. Hands-on development exercises will explore software solutions to real-world problems. Upon completion of this course, the students will possess a solid foundation to core Java functionality and will be able to make informed decisions regarding Java's suitability to address workplace challenges.

RECOMMENDED MATERIALS AND TEXTBOOK

- **Main source:** Sergey Aityan, INFO 5100 lecture notes
- **Recommended textbook:** Scott Brandt (2023). Java From Zero: Learn Java Programming Fast for Beginners to Professionals: The Complete Guide With Code Examples and Exercises to Become a Professional, 288 pages, ISBN-13 : 979-8377148494
- **Java reference source:** <https://www.w3schools.com/java/>

COURSE LEARNING OUTCOMES

At the completion of this course, the student should be able to:

- Describe the differences between traditional programming and object-oriented programming.
- Explain concepts related to object-oriented programming, including classes, objects, methods, inheritance, polymorphism, interfaces, overloading vs. overriding, and encapsulation.
- Design and develop programs in Java.
- Apply object-oriented principles and approach to design and develop software systems,

INSTRUCTIONAL METHODOLOGIES

This course will combine traditional lecturing with hands-on assignments that reinforce the lecture material. Lectures will focus on concepts and ideas while the assignments will provide practical experience and skills. Students will also have a final project, which allows them to apply their acquired knowledge to interesting topics.

EXAMS

- There will be both a midterm exam and a final exam.
- Each exam includes about eight questions (no multiple choice) and one or two programming assignments.
- The answers must be written clearly and easy to read, structurally with a clear and logical presentation of the answers.
- Graphs, charts, tables, and other supporting illustrations are required if needed.
- Examples to illustrate the answers are mandatory required.
- The exams are neither “open book” nor “open notes.”
- The final exam is comprehensive, i.e. includes the whole course.
- Cheating in exam results in immediate termination of the exam, and grade “F” with ZERO points.
- The instructor reserves the right to change the exam format, replace the written exam with a verbal exam or multiple choice if finds appropriate.

HOMEWORK, QUIZZES, ASSIGNMENTS, AND PROJECTS

- There will be home tasks each week during the course to be submitted by next week’s class. These home tasks will serve to develop practical skills on the learned material.
- A brief quiz may be given in class to check the students’ knowledge learned in the previous class.
- There will be 3 lab assignments required to submit during the course on the assigned day. The lab assignments will test the student's ability to design, develop, and test a complete program from start to finish. Each lab assignment should include a detailed description of the problem and the expected outcome. The details will be defined in each lab assignment.
- All students are required to work in teams on a course project. Each team consists of 4-6 members depending on the overall class size. The teams will present their complete project to the class at the end of the semester in a group presentation that consists of three parts: (1) a PowerPoint presentation with the problem statement, design ideas, major challenges, and results, (2) a live project demo, and (3) class discussion on the project. All team members should participate in the presentation by delivering a certain part of it. The team members absent in class at the time of their presentation will not pass the project assignment.

- All programming assignments should be submitted in the form of the file with the actual source code as well as the snapshot of the output.

GRADING POLICY

Each answer in assignment including exams labs, homework, and quizzes will be graded by points assigned to the task. The total percentage for each category of activities is calculated as the total collected points divided by the total possible maximum points.

Activity	Time	Percent weights
Quizzes, home tasks, and classroom activities	Every week	15%
Lab assignments (for all labs)	As assigned	15%
Course project	Last week of the course	30%
Mid-term exam	In the middle of the course	20%
Final exam	At the end of the course	20%

The final grade for the course will be given as the total weighted score for all activities according to the percentage weights shown in the table below.

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
% points	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	60-66	0-59

If both grades for the midterm and final exams are “F” the term grade for the course is “F” regardless of the grades for other activities.

NO MAKE-UP WORK

Assignments are to be completed on time during the course. Late assignments will result in a reduced grade. Mid-term and final exams and group presentations cannot be made up unless there was a documented emergency.

COURSE SCHEDULE

Classes		Topic	Chapters	
#	Date		Lectures	Textbook
1	Jan. 9	(a) About the course (b) Computers, software, languages, design, and coding	Ch. 1	---
2	Jan. 16	(a) Tools for Java Development (b) Setting up your development environment (c) Running your first simple java program	Ch. 2	Ch. 1
3	Jan. 23	(a) Setting up your own Java project (b) Classes objects, methods, expressions, and statements (c) Creating your first java project program with an archetype (d) Using comments in Java (e) Discussion on the course project	Ch. 3	Ch. 2 Ch. 3 Ch. 4
4	Jan. 30	(a) Data types and variables (b) Classes and Objects (c) Terminal input and output	Ch. 4	Ch. 5

5	Feb. 6	(a) Data Structures (b) Creating and using strings. (c) Arrays and Lists in Java (d) HashMap and HashSet (e) Discussion on the first lab assignment	Ch. 5	Ch. 6 Ch. 7
6	Feb. 13	(a) Arithmetic and Logical Operators in Java (b) Java Math (c) Conditional Statements	Ch. 6	Ch. 8
7	Feb. 20	(c) Loops (d) Methods in Java	Ch. 7 Ch. 8	Ch. 9 Ch. 10
8	Feb. 27	Midterm Exam	Ch.1-8 as in class	
	Mar. 5	Spring Break – No Classes		
9	Mar. 12	(a) Object-Oriented Design (OOD) and Object-Oriented Programming (OOP) (b) Classes (c) Adding new classes to your program (d) Discussion on the second lab assignment	Ch. 9	Ch. 11 ---
10	Mar. 19	(a) Inheritance, polymorphism, inner classes, abstraction, and interface (b) Four pillars of OOD: encapsulation, abstraction, inheritance, and polymorphism (c) Troubleshooting, handling errors and throwing exceptions	Ch. 10 Ch. 11	Ch. 12 --- Ch. 14
11	Mar. 26	(a) Reading and writing files in Java (b) Using databases in Java (c) Discussion on the third lab assignment	Ch. 12 Ch. 13	Ch. 15 Ch. 16
12	Apr. 2	(a) Application user interface (b) Software development life cycle (SDLC	Ch. 14 Ch. 15	--- ---
13	Apr. 9	(a) Functional Programming with Java	Ch. 16	---
14	Apr. 16	Comprehensive Final Exam	Ch.1-16 as in class	
15	Apr. 23	Group presentations of course projects		

CHEATING AND PLAGIARISM

Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit. Acts of cheating include, but are not limited to, the following:

- (a) plagiarism;
- (b) copying or attempting to copy from others during an examination or on an assignment;
- (c) communicating test information with another person during an examination;
- (d) allowing others to do an assignment or portion of an assignment;
- (e) using a commercial term paper service.

Cheating or plagiarism will result in zero points and letter grade F for an assignment, project, or exam and a report of the incident to the Dean of Students, who may place related documentation in a file. Repeated acts of cheating may result in an F in the course and/or disciplinary action.

OTHER COMMENTS

- Please participate. What you put into the class will determine what you get out of it – and what others get out of it.
- Please come on time. Late arrivals disturb everyone else.
- If you miss a class, you are responsible for getting lecture notes/slide printouts on the material covered from a classmate or the instructor.
- Use of cellular phones is prohibited during class or exams. Cellular phones must be turned off or silenced.
- Questions and comments during the class are welcome. Do not hesitate to ask questions – do not leave anything unclear for you.

MODIFICATION OF THE SYLLABUS:

The instructor reserves the right to modify this syllabus at any time during the semester. Announcements of any changes will be made in a classroom.