Carnegie Mellon HeinzCollege

Course Information	95712: Object Oriented Programming (JAVA) 12 Unit Course ***Instructor***: Dr. Murli Viswanathan Office: Torrens Building, Level 1, S.14 Phone: 81109926 E-mail: *mkrishna@cmu.edu* Office hours: See Canvas. ***Teaching Assistants***: Visit https://canvas.cmu.edu ***Meeting Times***: Check the class schedule **Lab sessions**: Check the class schedule ***Course Resources***: Visit https://canvas.cmu.edu
Prerequisites	Students are expected to have at least six months of undergraduate level programming experience in any procedural or object-oriented language immediately prior to taking this OOP JAVA course.
Description	95-712 is a one-semester, 12-unit course which covers the fundamentals of object-oriented programming using the Java language. The course will cover object-oriented principles in such as classes, objects, abstraction, composition, inheritance, polymorphism, and interfaces. Students will study about how these concepts can be programmed in the JAVA language. Along the way, we will have the occasion to visit many of the JAVA library classes that can be organized to solve a variety of problems. After some preliminaries devoted to basic syntax and program structure, classes, composition, inheritance, and polymorphism are examined. The JAVA collection classes are studied in some detail for data structures and algorithms, as is the rather complex set of I/O classes. Additional topics include exception handling, building GUIs with JavaFX, database connectivity with JDBC, and multi-threading. Students will also be exposed to Lambda expressions and the Streams API. The course is programming intensive. In most cases, the programming projects will be completed by individuals rather than teams. The course includes weekly lectures and a lab session. The lecture will cover theoretical concepts in JAVA where syllabus material will be presented, and the subject matter will be illustrated with demonstrations and examples. The hands-on lab focused on projects and problem solving will provide practice in JAVA programming, allow exploration of concepts with teaching assistants and other students, and give feedback on your progress and understanding. The teaching assistants will have an additional consultation session every week for assistance with topics covered in the lectures.

Course Materials	Lectures notes and any class material relevant for the lecture will be provided. Occasionally additional readings will be provided. Students must have access to the course textbook.
	
	Course Textbook:
	    Introduction to Java Programming and Data Structures, Global Edition, 11th Edition by Y. Daniel Liang, ISBN-13: 9781292221892
	Software:
	    Throughout the semester we will use the IntelliJ IDE with the JAVA SE JDK. **Students must use the IntelliJ IDE and the recommended version of the JAVA JDK** (See Canvas). We will also use **jGrasp**.

Course Objectives	 | Objective	How Assessed
Java language basics including variables, operators and program control. Use of the JAVA API classes including the Collections Framework and JavaFX.	Homework Assignments Final Exam
Principles of object oriented programming in Java with classes, inheritance, polymorphism, interfaces, containers and design patterns	Homework Assignments Team Project Final Exam
Basic UML and OO design concepts	Homework Assignments Final Exam	
Evaluation Method	Student performance in the class will be evaluated based on the following components: |	
Five Weekly Quizzes	5%
Seven homework Assignments	20%
Individual Project	5%
Week 4 Quiz	5%
Mid-term Exam	15%
Final Exam	50%
	100% | *Weekly Quizzes* In weeks 2,3,5,9,12 there will be a quiz to test your learning. Each quiz will have 10 questions with 15 minutes to complete. *Homework Assignments*: The homework assignments require students to think critically when applying the concepts learnt in the lectures. All assignments are programming-based. *Individual Project* Students will develop a complete JAVA application for a given problem domain.

	Exams: The exams will be a comprehensive closed book, closed notes exams. The exams are to be completed individually *without* help of any other student. The dates for the exams will be announced during the semester. The exams will be graded by the Instructor and class TA. Final grades will be posted in the official Student Information System that can be accessed by students directly through the Internet.
Grading Scale	A+ > 98% B+ 87% to 89% C+ 77% to 79% A 93% to 98% B 83% to 86% C 73% to 76% A- 90% to 92% B- 80% to 82% C- 70% to 72% *Scores below 70% equate to a failing grade (R)* The average grade in a required Heinz course is expected to be 3.33-3.4, equivalent to a B+. This expected average reflects the degree of difficulty and/or breadth of coverage for a core course. I do not curve final grades. 97.9% is an A grade.
Course Policies & Expectations	*Lectures*: While no attendance will be taken, it is in your interest to attend each lecture. Class participation is encouraged and expected. As research on learning shows, unexpected noises and movement automatically divert and capture people's attention. Arriving in the classroom late (after a lecture begins), using cell phones, pagers, laptops, etc. makes noise, are distracting and affect student learning experience. For this reason, I ask you to show up for each class a few minutes early and refrain from using your mobile devices during class. No student may record any classroom activity without the express written consent of the instructor. If a student believes that he/she has a learning disability and needs to record or tape classroom lectures/activities, he/she should contact the Office of Equal Opportunity Services, Disability Resources to request an appropriate accommodation. *Missed Classes*: Students are responsible for obtaining class material, which may have been distributed on days when they are absent. All material will be available on Canvas. *Assignments*: No assignments submitted after the deadline will be accepted, unless permission is granted by the instructor prior to the due date. Late assignments, if approved, should be submitted directly to the instructor. <u>No collaboration</u> in any form on assignments is allowed. All assignments are graded by class TA and reviewed by the instructor before they are returned to students. If you believe that your assignment was graded incorrectly, you may request that it be re-graded within a week of receiving your grade. To do this, turn in your graded assignment in question with an explanation of your arguments. *The entire assignment is subject to re-grading, not just the specific item(s) in question and the grade may go up or down.*

Academic Honesty and Integrity	All CMU students are expected to follow the ethical guidelines and adhere to the policies as defined in your Program's <u>Student Handbook</u> or in any other source describing such policies as they apply to students at Carnegie Mellon University. These policies and guidelines are available on the CMU web site. Please read them carefully! You will be held accountable for any violations of these policies and guidelines.
	
	Individual assignments must reflect individual effort. Although I expect you to attempt solving each problem on your own, I encourage you to seek help from the class TAs if you struggle with any assignment. Sharing your assignments with any other student in any form (whether it is a paper document, an electronic document such like a MS Word document, or a document in any other format) is not permitted and will be considered cheating. Any "discussion" between students that results in a similar HW submission is also not allowed. If you are in possession of any other person's document or file from this or any other semester, you are in jeopardy.
	
	Any violations of academic integrity in this class will have the following consequences:
	   (a) at the minimum, no credit for assignment in question <u>and</u> lowering final grade by one letter (e.g., from B to C);
	   (b) in more serious offences, failing the class;
	   (c) cases will be reported to the Dean's office
	
	All incidents of cheating are reported to the Associate Dean's Office.
	Additional penalties may be imposed.

Disability Issues & Wellbeing	If you have a disability and are registered with the Office of Disability Resources, I encourage you to use their online system to notify me of your accommodations and discuss your needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at access@andrew.cmu.edu. Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, I strongly encourage you to seek support. Counseling and Psychological Services (CaPS) are available. Contact the program director. Also consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

Course Outline	*Readings for each class are chapter numbers from Liang's textbook.*		

Week	Topics	Readings	Assessment Items
W1	Administrative stuff, Introduction to Object Oriented Programming, Basic elements	1,2	Assignment 1
W2	Program control, Operators, Basic I/O, Recursion	3,4,5,9,18	Assignment 2 (Assignment 1 due)
W3	Initialization and clean-up, I/O, Arrays, ArrayList, Composition, Implementation hiding	7,8,9,10	Assignment 3 (Assignment 2 due)
W4	Inheritance & Polymorphism Encapsulation Week 4 Exam	11	
W5	Advanced OOP, Abstract Classes & Interfaces, More Polymorphism	13	Assignment 4 (Assignment 3 due)
W6	Review, Design Patterns, Java I/0	12,17	
WEEK 7	Mid-Term Exam		Assignment 5 (Assignment 4 due)
W9	JAVA Error Handling and Exceptions, File I/O	12	*Project*
W10	JAVA Relationship Database Development. JDBC	34	Assignment 6 (Assignment 5 due)
W11	GUI development, JavaFX, Inner Classes, and Lambda Expressions	14,15,16	
W12	Lambda Expressions, The Collections Framework, Data structures & Algorithms	19,20,21	Assignment 7 (Assignment 6 due)
W13	The Collections Framework, Data structures & Algorithms, Generics	19, 20, 21	*Project Due*
W14	JAVA Concurrency (Multithreading) Streams	32	(Assignment 7 due)
WEEK 15	Final Exam		

Other important Information
- All course material is on the Canvas portal (https://canvas.cmu.edu/).
- Assignment Submission deadlines will be on Canvas.