Programming and Data Structures

Instructor: Houria Oudghiri
Email: hoo219@lehigh.edu
Office: PA-252
Office Hours: T 3:00 pm – 5:00 pm
F 10:00 am – 12:00 pm

Course Information
Course Number: CSE017
Semester: Fall 2022
Time: M-W 7:55-9:10 (010)
M-W 9:20-10:35 (012)
Location: PA-466

Instructor: Kallie Ziltz
Email: krz216@lehigh.edu
Office: PL 200b
Office Hours: W 1:00-3:00 pm (in person)
R 10 am - 12 noon (hybrid)

Course Information
Course Number: CSE017
Semester: Fall 2022

Class Time: T-R 1:35 - 2:50 (011) **Class Location**: PA-112

Course Description:

This course will cover the design and implementation of algorithms and data structures using Java. It assumes that students have had prior experience using conditional statements, loops, arrays, object-oriented programming, in Java, and will build on this knowledge to learn algorithmic techniques such as recursion, algorithm analysis, and sorting, and the design and implementation of data structures such as lists, queues, stacks, trees, and hash tables.

Course Prerequisite

CSE007 or CSE004 or (CSE002 and CSE012)

Required Textbook

Programming and Data Structures (Zybooks.com)

1. Sign in or create an account at *learn.zybooks.com*
2. Enter zyBook code: *LEHIGHCSE017Fall2022*
3. Subscribe

Student Learning Outcomes

At the end of this course, students should be able to:

1. Apply Object Oriented Concepts to handle exceptions and read/write data from/to text files in Java programs
2. Use Generic Programming to create generic data containers and generic methods
3. Implement and use common data structures: lists, stacks, queues, binary trees, and hash tables to store and manipulate data
4. Use recursion to implement algorithms
5. Evaluate the time complexity of given algorithms

6. Implement and compare the different sorting algorithms using algorithm analysis techniques

Grading

The final course grade is calculated based on the following assessment items.

Homework Assignments (4)	**10%**
Programming Projects (4)	**16%**
Active Learning Activities (10)	**10%**
Tests (2)	**30%**
Final Exam	**20%**
Reading Activities	**10%**
Attendance and Participation	**4%**

Attendance

Attendance is required. The participation grade is based on the class attendance/participation as well as the contributions made on Piazza.

Homework

Programming is not a talent but a skill. To develop such a skill, programming projects and class active learning activities (ALAs) are an essential component of the student learning in this class. ALAs, Homework and Programming projects should be submitted before the deadline. 2 points will be deducted from an assignment for every day late up to 5 days. Homework submitted after 5 days will not be graded and will receive a zero. Extensions may be granted upon justified requests.

Tools

Students can use an Integrated Development Environment (IDE) for this class. Recommended IDEs are ***Visual Studio Code***, ***Eclipse***, or ***NetBeans***. Students will use ***Github*** to submit their work. The submitted code should run on sunlab machines.

Statement on Academic Integrity

All programming assignments and tests submitted will be considered graded work and must be completed on an individual basis (unless stated otherwise). *ALA activities are the only exception to this, with the instructors often completing these activities with you during class time.* Homework and programming projects may be *discussed* with other students as well as with the instructors, TA and graders. Absolutely no consultation is permitted on tests. All submitted work is subject to assessment of software similarity.

However, in coding or working on a particular assignment, ***each student works alone and certifies that what is submitted accurately represents the student's own***

understanding of the material expressed in the student's own words. Failure to follow the expected rules of Academic Integrity will result in a failing grade for the submitted work.

Students are encouraged to use resources such as zyBooks, class lectures and activities, and Java API Documentation (from Oracle). **Students may not consult partial or complete solutions of the problems that have been prepared by anyone else**. While there are *constructive* and *appropriate* ways to collaborate, using anyone else's solution or sending your work to someone else to be fixed are **neither**.

Additional examples of academic integrity violations/non-violations specific to CSE are available here. You are additionally encouraged to review the Statement of Academic Integrity issued by the undergraduate student senate. Ignorance of rules as listed in the Code of Conduct does not excuse a student for violations of Academic Integrity.

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community (www.lehigh.edu/diversity). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Accommodations for Students with Disabilities:

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at https://studentaffairs.lehigh.edu/disabilities.

Lehigh University Policy on Harassment and Non-Discrimination

Lehigh University upholds The Principles of Our Equitable Community and is committed to providing an educational, working, co-curricular, social, and living environment for all students, staff, faculty, trustees, contract workers, and visitors that is free from harassment and discrimination on the basis of age, color, disability, gender identity or expression, genetic information, marital or familial status, national or ethnic origin, race, religion, sex, sexual orientation, or veteran status. Such harassment or discrimination is unacceptable behavior and will not be tolerated. The University strongly encourages (and, depending upon the circumstances, may require) students, faculty, staff or visitors who experience or witness harassment or discrimination, or have information about harassment or discrimination in University programs or activities, to immediately report such conduct. **If you have questions** about Lehigh's Policy on Harassment and Non-Discrimination or need to report harassment or discrimination, contact the Equal Opportunity Compliance Coordinator (Alumni Memorial Building / 610.758.3535 / eocc@lehigh.edu)

Course Outline

Week	**Topic**	**Readings (zybooks)**	**Active Learning Activities**	**Homework Assignments**
Week 1 Aug 22 – Aug 26	Introduction to the course Review of Java OOP fundamentals	2.1-2.6 2.10	**ALA 1**: OOP Overview	**HW1**: OOP Overview
Week 2 Aug 29 - Sep 2	Using Java Classes and Deriving New Classes (Exception handling and File IO)	3.1-3.5 4.1-4.5	**ALA 2**: Exceptions and File IO	**HW2**: Exceptions and File IO
Week 3 Sep 5 – Sep 9	Abstract Classes, and Interfaces	2.7-2.9 2.11	**ALA 3**: Abstract Classes/Interfaces	**PP1**: OOP/Exceptions/File IO
Week 4 Sep 12 - Sep 16	Recursion	5.1-5.9	**ALA 4**: Recursive methods	
Week 5 Sep 19 - Sep23	Generic Programming	6.1-6.4	**ALA 5**: Generic classes and methods	**HW3**: Recursion and Generics
Week 6 Sep 26 - Sep 30	Algorithm Analysis **(Test #1, Sep 29)**	7.1-7.9 14.2		
Week 7 Oct 3 - Oct 7	Using Data Structures: (Lists, Stacks, Queues)	8.1-8.6 9.1-9.6 14.3	**ALA 6**: Using Java API data structures	**HW 4**: Using Data Structures
Week 8 Oct 10 - Oct 14	Data Structure Implementations (Lists, Stacks, Queues) **(Pacing break: Oct 10)**	10.1-10.9 10.12-13 10.17-10.18 14.4	**ALA 7**: Implementing Data Structures	**PP2**: Implementing Data Structures
Week 9 Oct 17 - Oct 21				
Week 10 Oct 24 - Oct 28	Binary Trees: Binary Search Tree	11.1-11.11 14.5		

Week 11 Oct 31 - Nov 4	Binary Trees: Heap **(Test #2, Nov 3)**	12.1-12.5	**ALA 8**: Binary Trees	
Week 12 Nov 7 - Nov 11	Hashing **(Civic engagement Day: Nov 8)**	13.1-13.9 14.6	**ALA 9**: Hashing	**PP3**: Binary Trees and Hashing
Week 13 Nov 14 - Nov 19	Sorting Algorithms I	12.3 14.1-14.6 14.8	**ALA 10**: Sorting	
Week 14 Nov 21 - Nov 25	Sorting Algorithms II **(Thanksgiving break: Nov 23-25)**			**PP4**: Sorting Algorithms
Week 15 Nov 28 - Dec 2	Review Week			
Dec 6 - 14	**Final Exam Period**			

Important note: This syllabus may be subject to change at the instructors' discretion based on the progress made in class or changes to the mode of teaching (from in-person to remote).