Introduction to Data Structures Section 01

CS 46B

Fall 2024   4 Unit(s)   08/21/2024 to 12/09/2024   Modified 08/19/2024

👤 Contact Information

Instructor: Faranak Abri

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Office Hours: Mondays-Wednesdays 3PM-4PM

🕐 Course Information

Course Information

Class Days/Time: Mondays-Wednesdays 4:30PM - 5:45PM

Classroom: Science Building 142

Prerequisites

- CS 46A or CS 46AX (with grade of C- or better).
- Math Enrollment Category M-I or M-II and satisfactory score on the Precalculus Proficiency Assessment (70 or higher), or MATH 19 with a C- or better, or MATH 18A and MATH 18B with C- or better

Students are required to submit proof of prerequisite satisfaction by the specified deadline indicated on Canvas (additional details available on Canvas). Failure to do so will be considered as non-compliance with the prerequisites, **resulting in removal from the course.**

🖥 Course Description and Requisites

Fundamental data structures including lists, stacks, queues, and trees, with algorithms for inserting, deleting, searching, and sorting information within them efficiently.ï¿½Additional topics include Big-O analysis, exceptions, hashing, Java collections framework, generics, iterators, interfaces, recursion, and debugging. Weekly hands-on activities.

Lecture 3 hours/lab 3 hours.

Prerequisite(s): CS46Aï¿½or CS46AXï¿½(with a grade of "C-" or better). (If CS46A was not in Java, then CS46AW also required.) Math Enrollment Category M-I or M-II and satisfactory score on the Precalculus Proficiency Assessment (70 or higher), or MATH 19ï¿½with a C- or better, or MATH 18Aï¿½and MATH 18Bï¿½with C- or better; Allowed Majors: Computer Science, Data Science, Stats, Applied/Computational Math, Software Engineering or Forensic Science: Digital Evidence.

Letter Graded

✳ Classroom Protocols

Classroom Protocol

- *Students are expected to assist in maintaining a classroom environment that is conducive to learning. Inappropriate behavior in the classroom that leads to the distraction of others shall not be tolerated under any circumstances.*
- *Instruction will begin at or within several minutes of the official published start time for the course. Please make sure that cell phones, beepers, and texting devices are turned off during the entire scheduled class time. Excessive audible discussions with fellow students are prohibited so that others are not disturbed. If any subject matter is not understood, please do not hesitate to ask for clarification. If an extended response is necessary to remove doubts, then a request to follow up outside of scheduled classroom instruction time might be made.*
- *Per [University Policy S12-7](), course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without permission. Students may not publicly share or upload instructor-generated material for this course such as exam questions, lecture notes, or homework solutions, without the instructor's consent. This includes unauthorized recording or posting of recordings of lectures. [Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office.]() These policies are designed to protect student privacy and ensure academic integrity.*
- *[If a student is caught cheating on a homework assignment, the student will receive a 0 on that assignment. If a student is caught cheating on an exam, the student will receive an F in the course.]() The instructor must report any incidents of cheating or plagiarism to the University per [University Policy F15-7]().*

University Policies

- Per [University Policy S16-9](), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for the recording of the class, etc., and available student services (e.g., learning assistance, counseling, and other

resources) are listed on [Syllabus Information web page](https://www.sjsu.edu/curriculum/courses/syllabus-info.php)
(https://www.sjsu.edu/curriculum/courses/syllabus-info.php). Make sure to visit this page to review and be aware of these university policies and resources.

- University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "**Students should attend all meetings of their classes**, not only because they are responsible for material discussed therein, but because active participation is frequently essential to ensure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading." However, attendance will be required in order to complete and submit many in-class exercises, quizzes, and exams

- It is the aim of the faculty of SJSU to foster a spirit of complete honesty and a high standard of integrity. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic coursework. **Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development.** The attempt of students to present as their own any work that they have not honestly performed will be considered a violation. During quizzes and exams, communication with other individuals via any means is strictly prohibited without the express permission of the instructor. Violations will be met with the full impact of SJSU's academic integrity policy and procedures.

Additional Information

- **Religious Holy Day:** A student who intends to observe a religious holyday should make that intention known in writing to the instructor prior to the absence.

- **Students with Disabilities:** Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until proper confirmation from Student Disability Services has been provided. Presidential Directive 97-03 at https://sjsu.edu/president/docs/PD_1997-03.pdf requires that students with disabilities requesting accommodations register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

- **Basic Needs**: It is hard to succeed in any course if your basic needs are not met. SJSU has resources to assist with food or housing insecurity, emergency financial loans, and other assistance at SJSU Cares. A list of SJSU resources for student success (tutoring and other educational support), basic needs, mental health resources, COVID-19 relief resources, affinity groups on campus, and other helpful resources can be found here (link). This list is adapted from a list created by Dr. Wilkinson in

the biology department. These resources are available in order to help you succeed and make sure your basic needs are met. Please do not hesitate to make use of any available resources. If you have any questions or additions to this list, please reach out to the instructor.

- **Undergraduate Assistants**: This course has several learning assistants and lab instructors, and graders. The learning assistants are here to help you during in-class exercises and during the lab. The lab instructors will introduce the labs and work together with the learning assistants to help you learn the material. They are not here to debug your programs. They are here to support you in figuring out how to debug your programs on your own.

⋮☰ Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

◎ Course Goals

Course Description

Intermediate concepts of Java: Classes, Inheritance, Polymorphism, Memory management, Exceptions

Introductory concepts of Data Structures: Stacks and queues, recursion, lists, dynamic arrays, binary search trees. Iteration over collections. Hashing. Searching, elementary sorting. Big-O notation. Standard collection classes. Weekly hands-on activity.

Course Format

The course is delivered in person.

All students are required to have access to a wireless laptop (running OSX, Windows, or some version of UNIX), with a camera and microphone, upon which you can install the required software. You will need it for all classes, labs, and exams. The technology used will include Canvas, programming in Java, and an IDE (Integrated Development Environment).

On Fridays, there will be a lab. The lab will begin with a quiz and then students will progress through a programming activity working in small groups. To receive credit for the lab, your group will participate in a short exit interview or an exit quiz addressing questions from both the lab and the quiz with the lab instructor or learning assistant. <u>Missing more than two labs, will result in removal from the course or grade F.</u> In case of not attending the lab due to legitimate excuse, instructor need to be notified before the lab section begins to make alternate arrangements. The student can make up for a missed lab by attending lab instructor's office hours to complete the exit interview and receive the grade.

Canvas

It is the student's responsibility to check canvas and announcements regularly. For help with using Canvas, contact eCampus Program Mailbox <ecampus@sjsu.edu>.

📊 Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

1. *Use and work with basic structures such as linked lists, stacks, queues, binary search trees, and iterators.*
2. *Implement Java classes that embody data structures.*
3. *Use pre-existing implementations such as the Java Collections framework.*
4. *Make relative estimates of the running times of alternative algorithms using Big-O analysis.*
5. *Formulate and test for pre- and post-conditions.*
6. *Distinguish between different types of program defects and understand how testing and debugging are used to correct them.*
7. *Implement simple sorting algorithms such as Insertion Sort and Selection Sort.*
8. *Implement the Sequential Search and Binary Search algorithms.*
9. *Implement simple recursive algorithms such as binary tree traversal.*
10. *Work competently with commonly used tools for software development.*
11. *Create custom data structures when appropriate pre-existing classes are not available*

📘 Course Materials

Textbook

<u>Required</u>: ZyBook: CS 46B – Introduction to Data Structures (This book is created based on Cay S. Horstmann, Big Java: Early Objects and some other references)

Optional: Cay S. Horstmann, Big Java: Early Objects, 7/e, 2018, Wiley. https://www.wiley.com/en-

us/Big+Java%3A+Early+Objects%2C+7th+Edition-p-9781119499091 . E-Book with Self-Check Quizzes

Technology

You will need a wireless laptop with internet access and a camera and built-in microphone, for all classes, labs, and exams.

☰ Course Requirements and Assignments

Course Requirements and Assignments

- **Lecture:** Students are expected to attend lectures and participate in group or solo exercises. I reserve the right to increase this grade based on your participation in class activities, discussions, surveys, etc.
- **Homework:** Weekly Homework will be assigned and must be submitted based on the due date. Grade deduction will apply to late submissions.
- **Lab exams:** There will be two lab exams during the semester.
- **Lab:** The lab projects are an opportunity to put the concepts learned in lectures into practice and to improve students' Java programming. Lab projects will be completed in groups and individually. To get credit for completing the lab, you or your group must complete an exit interview. If you miss more than two labs, you will fail the course. **To make up for a missed lab, you must contact your lab instructor to complete the exit interview during their office hours to get the points for the missing lab.**
- **Exams:** There will be two exams during the semester.
- **Final Exam:** The final exam will be cumulative.

"Per University Policy S16-9, success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course-related activities, including but not limited to internships, labs, and clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus."

✔ Grading Information

Final Examination or Evaluation

Grades will be posted to canvas.

- Homework (15%)
- Lab exam1 (10%)
- Lab exam2 (10%)
- Lab (15%)
- Exam 1 (15%)
- Exam 2 (15%)
- Final (20%)

Grading Information

Extra credit may be included as bonus points. For late submissions, a grade deduction will be considered.

Your course grade will be determined by your final weighted average:

A plus = 97% or higher

A = 93% to 96%

A minus = 90% to 92%

B plus = 87% to 89%

B = 83% to 86%

B minus = 80% to 82%

C plus = 77% to 79%

C = 73% to 76%

C minus = 70% to 72%

D plus = 67% to 69%

D = 63% to 66%

D minus = 60% to 62%

F = 0% to 59%

"This course must be passed with a C- or better as a CSU graduation requirement."

🏛 University Policies

Per [University Policy S16-9 (PDF) (http://www.sjsu.edu/senate/docs/S16-9.pdf)](http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the [Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php)](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

📅 Course Schedule

CS 46B-01 / Introduction to Data Structures, Fall 2024, Course Schedule

There might be some changes to the course schedule due to the class circumstances.

Main section – Mondays & Wednesdays	Lab section - Fridays

Week/session	Date	Topics	Lab	Date	Lab activity
W0	8/21	Syllabus	W0	8/23	No lab
W1	8/26 & 8/28	Intro to Java/ Classes and methods	W1	8/30	Classes and methods
W2	9/2 & 9/4	Labor Day - Campus Closed (L) & Inheritance	W2	9/6	Inheritance
W3	9/9 & 9/11	Generics converting and casting	W3	9/13	converting and casting
W4	9/16 & 9/18	I/O & Exceptions	W4	9/20	I/O and exceptions
W5	9/23 & 9/25	I/O & Exceptions	W5	9/27	JUnit tests and exceptions
W6	9/30 & 10/2	Recursion	W6	10/4	Recursion
W7	10/7 & 10/9	Review & First exam	W7	10/11	Lab Exam1
W8	10/14 & 10/16	Big O & sort &search	W8	10/18	Sort 1&2
W9	10/21 & 10/23	Memory management and & Linked List	W9	10/25	Linked List (1)
W10	10/28 & 10/30	Linked List	W10	11/1	LinkedList (2)
W11	11/4 & 11/6	Stack, Queue	W11	11/8	Stack

W12	11/11 & 11/13	Veteran's Day (Observed) - Campus Closed) & Trees	W12	11/15	Trees
W13	11/18 & 11/20	BST & custom collection	W13	11/22	BST/Custom Collection
W14	11/25 & 11/27	Hash Tables, Sets & collections & Non-Instructional Day	W14	11/29	Rescheduled Holiday - Campus Closed (RH)
W15	12/2 & 12/4	Review & Second Exam	W15	12/6	Lab Exam2
W16	12/9	Review	-	-	

Final Exam

Monday, December 16 2:45-5 PM

https://www.sjsu.edu/classes/final-exam-schedule/fall-2024.php

Other important dates.

Sun, Aug. 18 Last day to drop for 100% refund

Tue, Sep 17: Last Day to Drop Classes without a "W" Grade

Fall 2024 calendar:

https://www.sjsu.edu/provost/docs/Academic-Calendar-2024-25.pdf

https://www.sjsu.edu/registrar/calendar/fall-2024.php