SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

# Introduction to Data Structures Section 01

## CS 46B

Fall 2023 4 Unit(s) 08/21/2023 to 12/06/2023 Modified 08/19/2023

## Contact Information


Instructor(s): Faranak Abri

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Office Hours: Mondays-Wednesdays 4:30PM-5:30PM (Zoom or in-person by appointment)

Class Days/Time: Mondays Wednesday 1:30 PM-2:45 PM

Classroom: Science Building 142

## Course Description and Requisites

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.

Prerequisite(s): Knowledge of Java equivalent to CS 46A (in Java) or CS 49J (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.

Lab/Act: Lecture 3 hours/lab 3 hours.

Letter Graded

## Classroom Protocols

**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). 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).

Most 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 addressing questions from both the lab and the quiz with the lab instructor or learning assistant. If you miss more than two labs, you will fail the course. If you cannot attend the lab due to illness, please notify me and your lab instructor before your lab section begins to make alternate arrangements. You can make up for a missed lab by attending your lab instructor's office hours to complete the exit interview and get the credit.

**Canvas**

It is the student's responsibility to check canvas regularly. For help with using Canvas see Canvas Student Resources page .

**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 a 0. The second incident of cheating will result in the student receiving an F in the course. The instructor must report any incidents of cheating or plagiarism to the University per University Policy F15-7.*

# 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 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

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

1. Sign in or create an account at learn.zybooks.com (Use your SJSU email, and also **your name** needs to be **the same as your name on canvas**)
2. Enter zyBook code: SJSUCS46BAbriFall2023
3. Subscribe

**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 . Required: E-Book with Self-Check Quizzes

# 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.
- **Mock Interviews:** Students will participate in one or two mock interviews during the semester. These interviews will be 15 minutes and will be a mock interview. The interviewer will be a TA or one of their classmates. These interviews will be announced on Canvas.
- **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.

It is the student's responsibility to check Canvas regularly. For help with using Canvas see the Canvas Student Resources page.

"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."

**Final Examination or Evaluation**

Grades will be posted to canvas, but they do not represent your weighted average in the course.

- Homework (15%)
- Mock Interviews (5%)
- Lab (15%)
- Exam 1 (20%)
- Exam 2 (20%)
- Final (25%)

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

# Grading Information

Course grade will be determined by final weighted average:

*A plus = 97% or higher*

*A = 93% up to 97%*

*A minus = 90% to 93%*

*B plus = 87% to 90%*

*B = 83% to 87%*

*B minus = 80% to 83%*

*C plus = 77% to 80%*

*C = 73% to 77%*

*C minus = 70% to 73%*

*D plus = 67% to 70%*

*D = 63% to 67%*

*D minus = 60% to 63%*

*F = 0% to 60%*

"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), 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) 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 2023, Course Schedule**

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

| Main section - Mondays | | | Main section - Wednesdays | | | Lab section - Fridays | | |
|---|---|---|---|---|---|---|---|---|
| Week/ session | Date | Topics | Week/ session | Date | Topics | Lab | Date | Lab activity |
| w1/s1 | 8/21 | Intro to Java/ Classes and methods | w1/s2 | 8/23 | Intro to Java/ Big O | w1/s1 | 2/3 | Classes and methods |
| w2/s3 | 8/28 | Inheritance | w2/s4 | 8/30 | Inheritance | w2/s2 | 9/1 | Inheritance |
| w3/s5 | 9/4 | Labor Day - Campus Closed (L) | w3/s6 | 9/6 | Generics | w3/s3 | 9/8 | converting and casting |
| w4/s7 | 9/11 | I/O | w4/s8 | 9/13 | I/O | w4/s4 | 9/15 | I/O and exceptions |
| w5/s9 | 9/18 | Exceptions | w5/s10 | 9/20 | Exceptions | w5/s5 | 9/22 | JUnit tests and exceptions |
| w6/s11 | 9/25 | Recursion | w6/s12 | 9/27 | Recursion | w6/s6 | 9/29 | Recursion |

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|---|---|---|---|---|---|---|---|---|
| w7/s13 | 10/2 | Memory management and Big O | w7/s14 | 10/4 | Searching & Sort | w7/s7 | 10/6 | Sort |
| w8/s15 | 10/9 | Searching & Sort | w8/s16 | 10/11 | Linked List | w8/s8 | 10/13 | Linked List (1) |
| w9/s17 | 10/16 | review | w9/s18 | 10/18 | First exam<br><br>(end of Search and Sort) | w9/s9 | 10/20 | Mock interview1 |
| w10/s1 | 10/23 | Linked List | w10/s2 | 10/25 | Linked Lists | w10/s10 | 10/27 | LinkedList (2) |
| w11/s2 | 10/30 | Stack, Queue | w11/s2 | 11/1 | Stack, Queue | w11/s1 | 11/3 | Stack |
| w12/s2 | 11/6 | Hash Tables | w12/s2 | 11/8 | Hash Tables | w12/s1 | 11/10 | Veteran's Day (Observed) - Campus Closed) |
| w13/s25 | 11/13 | BSTs | w13/s2 | 11/15 | BSTs | w13/s1 | 11/17 | Trees & BST |
| w14/s27 | 11/20 | BSTs | w14/s28 | 11/22 | Non-Instructional Day | w14/s14 | 11/24 | Rescheduled Holiday - Campus Closed (RH) |
| w15/s29 | 11/27 | review | w15/s30 | 11/29 | Second Exam (End of BST) | w15/s15 | 12/1 | Mock interview2 |
| w16/s31 | 12/4 | Sets & collections | w16/s32 | 12/6 | Review | w15/s16 | - | No lab |

Final Exam

Wednesday, December 13, at 12:15-2:30 PM

https://www.sjsu.edu/classes/final-exam-schedule/fall-2023.php

Other important dates.

Sep 15: Last Day to Drop Classes without a "W" Grade

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Fall 2023 calendar:

https://www.sjsu.edu/provost/docs/Academic_Calendar-AY2023-24.pdf

https://www.sjsu.edu/registrar/calendar/fall-2023.php