

Introduction to Data Structures Section 01

CS 46B

Spring 2024 4 Unit(s) 01/24/2024 to 05/13/2024 Modified 01/28/2024

Contact Information

Instructor(s): Faranak Abri

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Office Hours: Tuesdays-Thursdays 10:30AM-11:30AM (in-person or on Zoom by appointment)

Class Days/Time: Tuesdays-Thursdays 12 PM-1:15 PM

Classroom: Science Building 142

Course Information

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.

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. Additional 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): CS46Ai½or CS46AXi½(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 19i½with a C- or better, or MATH 18Ai½and MATH 18Bi½with C- or better; Allowed Majors: Computer Science, Data Science, Stats, Applied/Computational Math, Software Engineering or Forensic Science: Digital Evidence.

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 (ungraded) 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. **Missing more than two labs, will result in removal from the course or grade E.** 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 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 an F in the course. The instructor must report any incidents of cheating or plagiarism to the University per [University Policy F15-Z](#).*

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: SJSUCS46BAbsriSpring2024
3. Subscribe

Optional: Cay S. Horstmann, Big Java: Early Objects, 7/e, 2018, Wiley. [https://www.wiley.com/en-](https://www.wiley.com/en-us/Big+Java%3A+Early+Objects%2C+7th+Edition-p-9781119499091)

[us/Big+Java%3A+Early+Objects%2C+7th+Edition-p-9781119499091](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.
- **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.

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:

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

✓ 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) (<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, Spring 2024, Course Schedule

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

Main section - Mondays			Lab section - Fridays		
Week/ session	Date	Topics	Lab	Date	Lab activity
W0/s0	1/25	Syllabus	W0/s0	1/26	--
W1/s1,2	1/30 & 2/1	Intro to Java/ Classes and methods	W1/s1	2/2	Classes and methods
W2/s3,4	2/6 & 2/8	Inheritance	W2/s2	2/9	Inheritance
W3/s5,6	2/13 & 2/15	Generics converting and casting	W3/s3	2/16	converting and casting
W4/s7,8	2/20 & 2/22	I/O & Exceptions	W4/s4	2/23	I/O and exceptions
W5/s9,10	2/27 & 2/29	I/O & Exceptions	W5/s5	3/1	JUnit tests and exceptions
W6/s11,12	3/5 & 3/7	Recursion	W6/s6	3/8	Recursion

W7/s13,14	3/12 & 3/14	Review & First exam	W7/s7	3/15	Lab Exam1
W8/s15,16	3/19 & 3/21	Big O & sort & search	W8/s8	3/22	Sort 1&2
W9/s17,18	3/26 & 3/28	Memory management and & Linked List	W9/s9	3/29	Linked List (1)
w10/s19,20	4/2 & 4/4	Spring Recess	W10/s10	4/5	Spring Recess
w11/s21,22	4/9 & 4/11	Linked List	W11/s11	4/12	LinkedList (2)
w12/s23,24	4/16 & 4/18	Stack, Queue	w12/s12	4/19	Stack
w13/s25,26	4/23 & 4/25	Trees,BST	w13/s13	4/26	BST
w14/s27,28	4/30 & 5/2	Hash Tables, Sets & collections	w14/s14	5/3	Custom collection
w15/s29,30	5/7 & 5/9	Review & Second Exam	w15/s15	5/10	Lab Exam2

Final Exam

Monday, May 20 at 9:45 AM-12:00 PM

<https://www.sjsu.edu/classes/final-exam-schedule/spring-2024.php>

Other important dates.

Feb 19: Last Day to Drop Courses without an Entry on Student's Permanent Record (D)

Spring 2024 calendar:

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

<https://www.sjsu.edu/registrar/calendar/spring-2024.php>