# San José State University
# Department of Computer Science
# CS46B, Introduction to Data Structures, Section 1

# Spring Semester, 2016

**Course and Contact Information**

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| **Instructor:** | Philip Heller |
| **Office Location:** | DH282 |
| **Email:** | pheller@mlml.calstate.edu |
| **Office Hours:** | Monday/Wednesday 1630-1730 |
| **Class Days/Time:** | Monday/Wednesday 1500-1615 |
| **Classroom:** | WSQ 109 |
| **Prerequisites:** | Knowledge of Java equivalent to that obtained by completing CS 046A or CS 049J with grade of C- or better. Eligibility for Math 030 or Math 030P, or instructor consent. Math remediation completed or a post baccalaureate. Pre/Co-requisite: Math 42. |

**Course Description**

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.

**Learning Outcomes**

**Course Learning Outcomes (CLO)**

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 defect, 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.

## Required Texts/Readings

### Textbook

Cay S. Horstmann, Java Concepts 7th Edition. ISBN 978-1-118-43112-2 (paper) or 978-1-118-54939-1 (ebook). You can get a lower cost version of the book at the SJSU bookstore with ISBN 978-1-118-60771-8.

### Other equipment / material requirements

Students are required to bring a wireless-enabled laptop to every lecture, lab meeting, and exam, with sufficient charge to last the entire meeting. Lecture and lab rooms have limited electrical outlets, to which access cannot be guaranteed.

## Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Exams: Two in-class exams (15% each) and one final exam (30%). Missed exams cannot be made up except for reasons of illness as certified by a doctor, or documentable extreme emergency. Makeup exams may be oral.

Programming Assignments: One programming assignment per week (35%). Late work is not accepted.

Participation: You will be graded on class participation via online discussion in Piazza (5%). You are expected to post regularly, either asking or answering questions. You also are expected to answer the in-class questions that will be asked in Piazza.

Labs: You must enroll for a lab section and attend all labs. You will fail the course if you don't pass the lab section, or if you miss more than 3 labs.

## Grading Policy

This course is graded ABC/NC:

| At least | Letter Grade |
|---|---|
| 93% | A |
| 90% | A- |
| 87% | B+ |
| 83% | B |
| 80% | B- |
| 77% | C+ |
| 73% | C |
| below 73% | NC |

All programming assignments are weighted equally. Work will not be accepted after the due date/time specified in each assignment.

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

## University Policies

### General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU's policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf. More detailed information on a variety of related topics is available in the SJSU catalog, at http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

### Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

### Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- "Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material."
    - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
    - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- "Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent."

### Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. 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 course work. Faculty members are required to report all infractions to the office of

Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

**Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

# CS46B Introduction to Data Structures, Spring 2016, Course Schedule

*This schedule is subject to change; changes will be announced during lecture.*

**Course Schedule**

| Week | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| 1 | Feb 1 | Text sections 9.1-9.2 (Inheritance, Subclasses) |
| 1 | Feb 3 | 9.3-9.4 (Overriding, Polymorphism) |
| 2 | Feb 8 | 9.5 (The Object Class) |
| 2 | Feb 10 | 10.1-10.2 (Interfaces) |
| 3 | Feb 15 | 10.3-10.5 (Interfaces, Inner Classes) |
| 3 | Feb 17 | 11.1-11.3 (I/O) |
| 4 | Feb 22 | 11.4-11.5 (Exceptions and Assertions) |
| 4 | Feb 23 | 13.1-13.2 (Recursion) |
| 5 | Feb 29 | 13.3-13.4 (Recursion) |
| 5 | Mar 2 | Review |
| 6 | Mar 7 | Exam 1 |
| 6 | Mar 9 | 14.1-14.3 (Selection Sort) |
| 7 | Mar 14 | 14.4-14.5 (Merge Sort) |
| 7 | Mar 16 | 14.6-14.8 (Searching, Running Time) |
| 8 | Mar 21 | 15.1-15.2 (Collections Framework, Linked Lists) |
| 8 | Mar 23 | 15.3-15.4 (Sets and Maps) |
| 9 | Mar 28 | 15.5-15.6 (Stacks and Queues) |
| 9 | Mar 30 | 16.1 (Linked Lists) |
| 10 | Apr 4 | 16.1 (Implementation) |
| 10 | Apr 6 | 16.2 (Iteration) |
| 11 | Apr 11 | Review |
| 11 | Apr 13 | Exam 2 |
| 12 | Apr 18 | 17.1 (Trees) |
| 12 | Apr 20 | 17.2-17.3 (Binary Trees) |
| 13 | Apr 25 | 17.4 (Red-Black Trees) |
| 13 | Apr 27 | Creating Custom Data Structures (No reading assignment) |
| 14 | May 2 | Creating Custom Data Structures (No reading assignment) |
| 14 | May 4 | Creating Custom Data Structures (No reading assignment) |
| 15 | May 9 | Creating Custom Data Structures (No reading assignment) |

| Week | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| 15 | May11 | Review (No reading assignment) |
| 16 | May 16 | Review (No homework or lab this week) |
| Final Exam | May 20 (Fri) | WSQ 109 (Same as lectures). 1215-1430. |