We assume that you are proficient at object-oriented programming in Java.

Instructors

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See syllabus page for online readings and lecture outlines (no textbook)

**Waitlisted?** Continue attending. Some seats might open.

**Today**

Collections

- bag intro
- abstract data types and data structures
- designing an Integer Bag ADT – Java interfaces
- using the Integer Bag ADT – review of autoboxing

Characteristics of Good & Reusable Software

Generalizing the Integer Bag ADT – Java **Object**

Implementing a General Bag ADT

**Next Time**

Read: *Introduction*, start *Lists*

Implementing the Bag ADT

- casting when using **Object**
- using Java generics for generality

List ADT

- designing the ListADT
- coding the ListADT as a Java interface
Collections

→ What is a collection?

→ What operations can you do on a collection? Which are the most fundamental?
Example: Bags

Concept

Operations

Problems

→ What problems might occur when doing Bag operations?
ADTs - Abstract Data Types

ADTs vs. Data Structures

Abstract Data Type (ADT)

Data Structure (DS)
Designing an Integer Bag ADT

Conceptual Description

Public Interface

Coding Issues
Example 1: Using the Integer Bag ADT

➢ Write a code fragment
to put the numbers 0 through 99 into an Integer Bag ADT named bag.

```
IntegerBagADT bag = new ...;  //assume bag has been instantiated here
```

Java Autoboxing Review
Example 2: Using the Integer Bag ADT

→ **Complete the printBag method**
  so that it prints the contents of the parameter `bag`.

*Challenge:* Implement your `printBag` method so that it doesn’t change the bag’s contents.

```java
public static void printBag(IntegerBagADT bag) {
```
What makes software good?

What makes code reusable?
Generalizing the Integer Bag ADT

➔ What class in Java can be used to reference any Java object?

➔ What modifications are needed to generalize our Integer Bag ADT?

```java
import java.util.*;

public interface IntegerBagADT {

    void add(Integer item);
    Integer remove() throws NoSuchElementException;
    boolean isEmpty();
}
```
Implementing BagADT Using an Array of Object References

public class ArrayBag

    //instance variables

    //constructor

    //BagADT methods

    // could add other methods specific to the array implementation