

# CSC 222: Object-Oriented Programming

Fall 2017

See online syllabus at: [dave-reed.com/csc222](http://dave-reed.com/csc222)

## Course goals:

- To know and use basic Java programming constructs for object-oriented problem solving (e.g., classes, polymorphism, inheritance, interfaces).
- To appreciate the role of algorithms and data structures in problem solving and software design (e.g., object-oriented design, lists, files, searching and sorting).
- To be able to design and implement a Java program to model a real-world system, and subsequently analyze its behavior.
- To develop programming skills that can serve as a foundation for further study in computer science.



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## Assumed background

technically, CSC 221 is a prerequisite for this course

- what is really needed is basic programming & problem-solving experience
  - ✓ variables: data types, assignments, expressions
  - ✓ control structures: if, if-else, while, for
  - ✓ functions: parameters, return, libraries
  - ✓ data structures: strings, lists, files
- early on, I will map Java constructs back to their corresponding Python
- if you learned a different language, will need to make your own connection

as an intro, 221 focused on programming-in-the-small

- simple problems; could be solved in 1-3 functions; few design choices

this class extends to programming-in-the-medium

- and lays the groundwork for programming-in-the-large by emphasizing the *object-oriented approach* to software design

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## When problems start to get complex...

### ...choosing the right algorithm and data structures are important

- e.g., phone book lookup, checkerboard puzzle, word ladders
- must develop problem-solving approaches (e.g., iteration, recursion)
- be able to identify appropriate data structures (e.g., array, ArrayList, stack, queue)

### ...code reuse is important

- designing, implementing, and testing large software projects is HARD  
whenever possible, want to utilize existing, debugged code
- reusable code is:
  - clear and readable (well documented, uses meaningful names, no tricks)
  - modular (general, independent routines – test & debug once, then reuse)

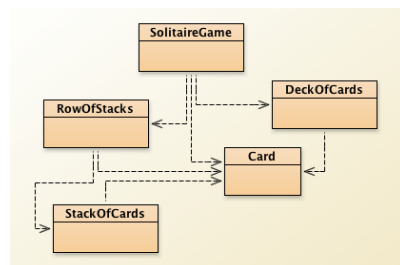
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## Object-oriented programming

OOP is the standard approach to software engineering

### philosophy: modularity and reuse apply to data as well as functions

- when solving a problem, must identify the objects involved  
e.g., banking system: customer, checking account, savings account, ...
- develop a software model of the objects in the form of *abstract data types* (ADTs)  
an ADT is a collection of data items and the associated operations on that data  
in Java, ADTs are known as *classes*



### focus on software objects:

- hides unnecessary details (programmer doesn't have to know the details of the class in order to use it)
- ensures the integrity of data (programmer can only access public operations)
- allows for reuse and easy modification (can plug classes into different applications)

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## Getting started

recall: you got a sneak peek at OO at the end of 221

we will start next week with basic Java programming constructs

- variables, expressions, conditionals, loops, functions, ...  
will map from Python to Java, get lots of hands-on practice (using [codingbat.com](http://codingbat.com))
- then will learn how to package these constructs into classes and objects  
eventually, will think and design in an object-oriented way

we will eventually be using the BlueJ development environment

- contained on the CD that comes with the book
- can also be downloaded for free from the Web
  - BlueJ (4.1) from [www.bluej.org](http://www.bluej.org)
- BlueJ is a simple, visual environment; designed for beginners to OO approach