

Foundations of Business Programming (33:136:388)

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Business-oriented programming accounts for the vast majority of all programs written today. This course covers the principles of programming and software development in depth, using Java and an “objects-last” approach. The class emphasizes the application on computer programming based on “success stories” in various fields (including, but not limited to, software industry, engineering, applied math and finance), taking an interdisciplinary approach to teaching programming with Java. The course does not assume any prior experience in computer programming. Upon completion of the course, students will know the fundamentals not only of Java, but more importantly of core programming and computational thinking concepts. The course also covers basics of modern integrated development environments (IDEs), using Eclipse, exposes students to modern software development practices such as unit testing, and includes regular hands-on programming homeworks. Advanced topics that may be covered include UML modeling, fundamental data structures, and Java generics libraries.

List of topics

- Introduction
 - Your first program
 - Introduction to Eclipse
- Values and data types
 - Built-in data types (including strings)
 - Expressions
 - Statements
- Conditionals and loops
 - If-then-else statements
 - While and for loops
 - Nested loops
 - (Random walks and Monte Carlo)
- Arrays
 - Array data types
 - New and delete operators; the heap and garbage collection
 - Two-dimensional arrays
 - (Random shuffles and the coupon collector problems)
- Functions
 - Introduction to functions
 - Arguments and return values
 - Overloading
 - Modular programming and libraries
- Object-Oriented Programming (OOP)
 - Creating data types
 - Classes and objects

- Methods, encapsulation
- Advanced topics (subject to change; time permitting)
 - Interfaces, inheritance (sub-typing), and polymorphism
 - Recursion
 - Java generics libraries
 - Basic data structures (stack and queue, list, tree)
 - UML modeling

Textbook

- “Introduction to Programming in Java: An Interdisciplinary Approach”, Robert Sedgewick and Kevin Wayne, Pearson, 2007.

Grading policies

40% Programming assignments

30% Midterm

30% Final