

# Data Structures and Algorithms

## COMP47500

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- **Algorithm:** a procedure or formula for solving a problem.
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- **The Course:** The study of how to organise and manipulate data in computer programs.



# Objectives

- Get a strong basic understanding of Java Programming.
  - Java Tutorials:  
<http://download.oracle.com/javase/tutorial/>
- (Re-)Introduce some features of Object-Oriented programming such as Interfaces and Inheritance.
- Introduce some fundamental Algorithm Analysis techniques.
- Learn some data structures / techniques



# Course Overview

- Marking Scheme

- Assignments 50%
- Final Examination 50%

- Course Duration

- 12 weeks of lecturing
- 1 week revision time
- Exam (mid December)



# Assignments :

- Follow instructions and deadlines for individual assignments



# Topics

- Java Concepts

- Introduction to Object and Classes
- Fundamental Data types
- Decisions
- Iteration
- Arrays and Array Lists
- Designing classes
- Inheritance
- Input / Output and Exception Handling
- Object Oriented Design
- Recursion
- Sorting and Searching





# Topics

- Introduction to Algorithm Analysis
  - Pseudo Code
  - Operation Counting / Big 'Oh' Notation
  - Experimental Analysis
  - Sorting & Searching Algorithms
- Object-Oriented Principles
  - Classes, Methods, and Fields
  - Interfaces and Exceptions
- Stacks, Queues and Deques
  - Array-based Implementations
  - List-based Implementations



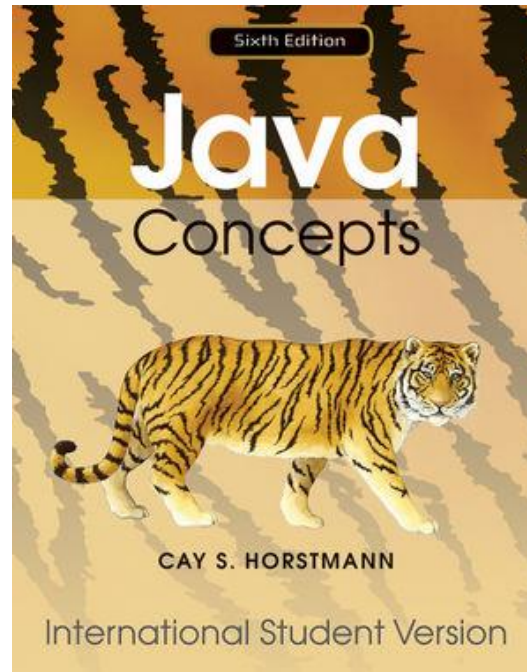
# Topics

- Lists & Sequences
  - Linked-Lists
  - Extendable Arrays
  - Rank vs Position
  - Sorting and Searching
- Advanced Data Structures
  - Priority Queues
  - Heaps

etc..

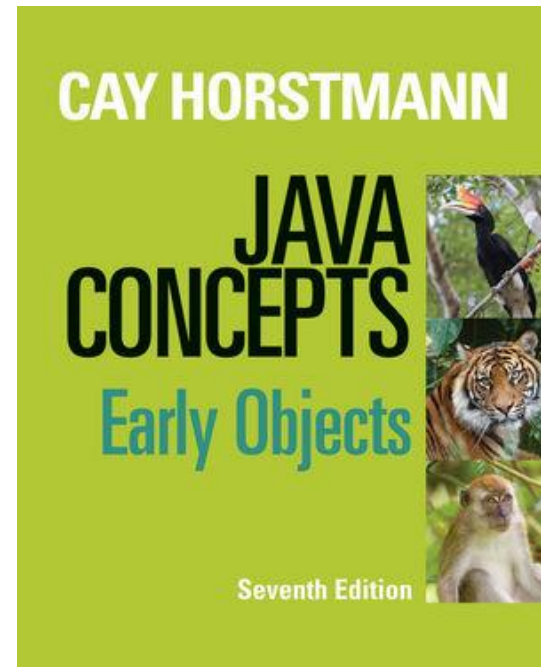
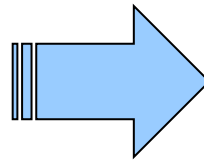
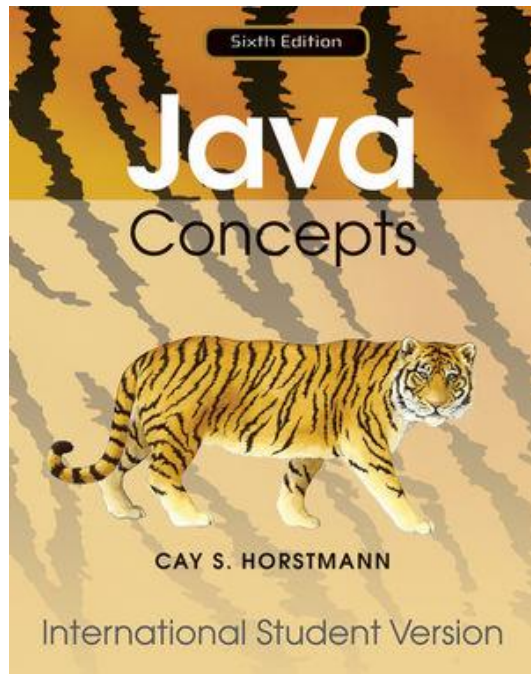


# Recommended Reading

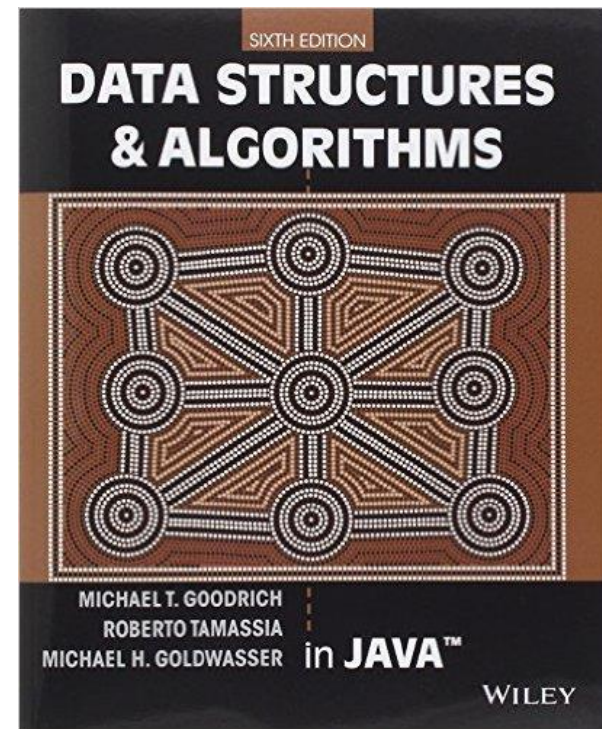
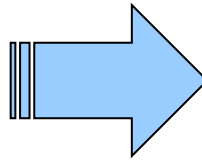
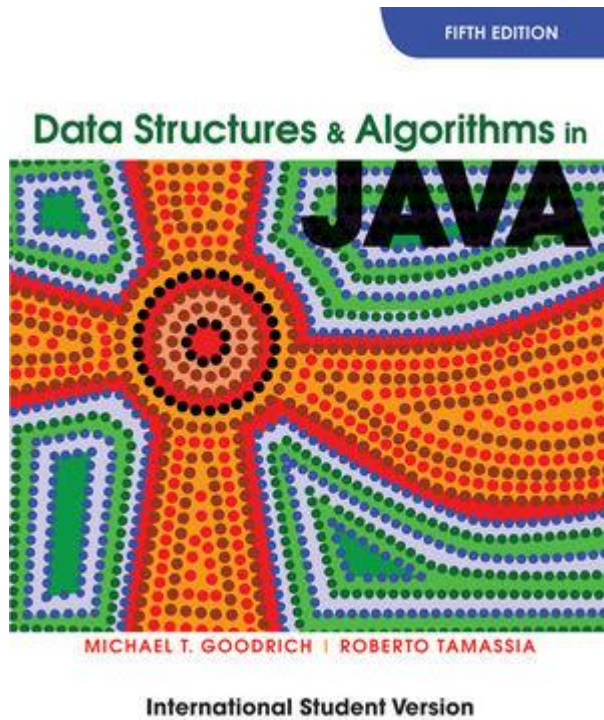


# Recommended Reading

## New Version Textbook



# Recommended Reading



# Software Requirements

- For this course, you will need:
  - Latest Version of the Java SE Developer Kit
    - <http://java.sun.com>
  - Eclipse IDE (for writing your code)
    - <http://www.eclipse.org>
- Notes:
  - You will get some help and guidance on how to use Eclipse in the first worksheet – download the latest version of the software available.
  - Generally, you will need to know how to create a Java Project in Eclipse and then how to create classes.



# A Word to the Wise...





# How to PASS this Course

- Strategy:
  - Do the assignments + 50%
- Exam : 50%
- Reality:
  - EVERYONE with a practical mark  $> 30\%$  last year PASSED

