

Algorithms & Data Structures

Course Presentation

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Edition 2015-2016

Welcome!

In this course we will learn *fundamental data structures and algorithms for organizing and processing information*

- “Classic” data structures / algorithms
- How to rigorously analyze their efficiency
- How to decide when to use them
- Stacks, Queues, trees, sorting, etc.

There are **two** courses on this topic:

- **Algorithms & Data Structures 1: this course**
- Algorithms & Data Structures 2: second part, scheduled next semester

Goals

- Understand **basic algorithms** and **data structures**
- Understand/Analyze their **complexity**
- Be able to code them in a **programming language (Java)**
- Be able to **make good design choices** as a developer, project manager, etc.
- Be able to **justify** and **communicate** your design decisions

You will learn the key abstractions used almost every day in just about anything related to computing and software.

This is not a course about Java! We use Java as a tool, but the data structures you learn about can be implemented in any language.

Course organization

- **Course web page**

`http://users.polytech.unice.fr/~gaetano/ads`

login: si3 password: ADS2015

- **Course duration**

- 6 weeks

- **Lectures**

- 1 hour every Monday morning

- Start with a quizz on the current lesson

- **Labs**

- Exercises to be done during the lab and to complete as homeworks

Staff

- **Marc Gaetano**
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 - Lectures, G3 (labs)
- **Christophe Papazian**
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 - G1, G2, G4 (labs)

Course materials

- We'll be using Java for the programming assignments
 - Java 8
 - Eclipse IDE
- Textbook:
Data Structures and Algorithm Analysis in Java
by Mark Allen Weiss, 3rd edition, Addison-Wesley, 2012
A PDF copy is available on the course web pabe
- A good Java reference of your choosing
Don't struggle **Goog**ling for features you don't understand, just link to a reference page you like and stick to it!

Grading system

- **Homeworks: 20%**
 - To be done individually
 - Initiated during labs
 - To turn in by end of the week
- **Quizzes: 30%**
 - About the lesson you have to review yourself
 - One quizz per week (6 quizzes total)
 - 10-20 minutes
- **Final exam: 50%**
 - Paper-based
 - Closed everything

What this course will cover (ADS 1)

- Introduction to Algorithm Analysis
- Lists, Stacks, Queues
- Binary Search Trees
- Heaps, Priority Queues
- Sorting

What part 2 will cover (ADS 2)

- Hashing
- Disjoint Sets
- Graphs algorithms