

Algorithms & Data Structures I

CSC 225

Ali Mashreghi

Fall 2018



Department of Computer Science, University of Victoria

Course overview

- **Problem solving!**

Course overview

- **Problem solving!**

- 1. Define a problem**

Course overview

- **Problem solving!**

1. Define a problem

- 2. Pick the appropriate approach**

- **Using suitable algorithms and data structures**

Course overview

- **Problem solving!**

1. Define a problem
2. Pick the appropriate approach

- 3. Find a solution**

- **Which needs creativity!**

Course overview

- **Problem solving!**

1. Define a problem
2. Pick the appropriate approach
3. Find a solution

- 4. Prove correctness**

- **Using various proof techniques**

Course overview

- **Problem solving!**

1. Define a problem
2. Pick the appropriate approach
3. Find a solution
4. Prove correctness

- 5. Analyze the performance**

- **In a very cool way by excluding boring details**

Course overview

- **Problem solving!**

1. Define a problem
2. Pick the appropriate approach
3. Find a solution
4. Prove correctness
5. Analyze the performance

- 6. Implement the solution**

- **Writing what's on your mind in a clear way**

Topics

Algorithm Design and Analysis

- Time and space complexity
- Asymptotic analysis
- Recursion
- Basic data structures: arrays, lists, stacks and queues

Searching and Sorting

- General purpose sorting algorithms, such as Heap sort, Insertion sort, Merge sort, Quick sort, and Selection sort
- Special purpose sorting algorithms, such as Radix sort, and Bucket sort

Data structures

- Priority Queues
- Trees
- Hash tables

Graphs

- Data structures for graph representation
- Fundamental graph traversal algorithms and applications
- Connectivity and strong connectivity
- Topological sorting

Goal

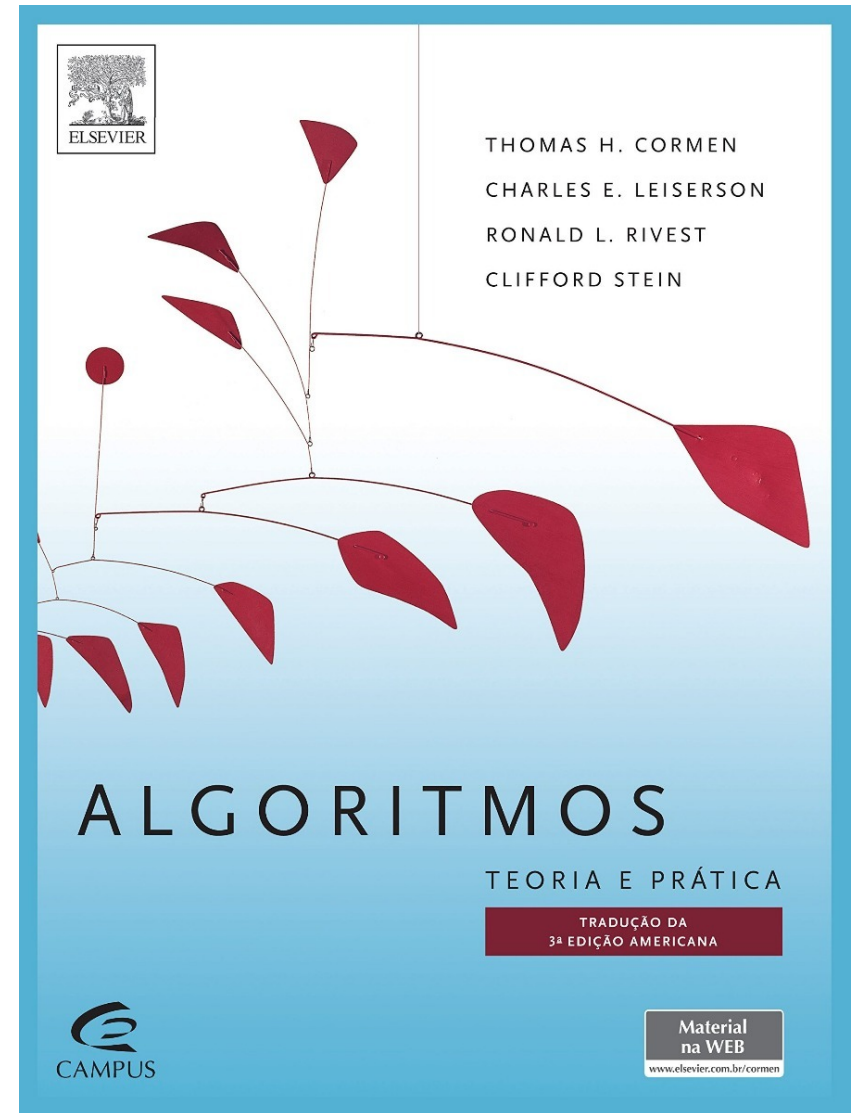
To become an algorithmist and a programmer!



Textbook

- CLRS, **third** edition!
- Download online for **free**!
- Link to solutions :)

<http://sites.math.rutgers.edu/~ajl213/CLRS/CLRS.html>



Requirements

- 4 written assignments, 30% overall
 - 8 programming assignments, 30% overall
 - Midterm 10% in class
 - Final 30% TBA
-
- Need 50% overall, 50% of assignments and 50% of the exams to pass.

Programming assignments

- 8 programming assignments, **30%** overall, **3.75%** each



- An awesome platform to get used to online programming and coding interviews.
- Email me on amashreg@uvic.ca send me your V number to be assigned a random username to use for registration.
- Need Connex submissions, as well. No later than 1 hour after the deadline.

Programming assignments

- 8 programming assignments, **30%** overall, **3.75%** each



- An awesome platform to get used to online programming and coding interviews.
- Email me on amashreg@uvic.ca send me your V number to be assigned a random username to use for registration.
- Need Connex submissions, as well. No later than 1 hour after the deadline.

Connex and Hackerrank

- You can login into Connex from here using your netlink credentials:

<https://connex.csc.uvic.ca/portal>

- Our course is **CSC 225: 201809 A01**
- After getting your random username, you can sign up for Hackerrank from this address:

<https://www.hackerrank.com/signup>

- And login from here:

<https://www.hackerrank.com/login>

Labs

- 10 labs starting next week (theory and programming).
- TAs are Navid Assadian, and Jasbir Singh.
- Java language is used in the labs and in the course.
- Labs have the Netbeans IDE.

- Attending lectures is **not mandatory!**
- Attending labs is **not mandatory!**
- There are **no quizzes!**

Test material

1. **Slides**
2. Problems presented in the **labs**
3. **Parts of the book** that I have assigned for reading
4. Written and programming **assignments**

Office hours:

- ECS 623 - Tuesdays, and Fridays 12-13 (not this week)

Link to course outline: <https://heat.csc.uvic.ca/coview/course/2018091/CSC225>