

## VE477

# Introduction to Algorithms

## Syllabus

Manuel — UM-JI (Fall 2021)

- 1 Presentation
- 2 Teaching team
- 3 Schedule
- 4 Course content and objectives
- 5 Grading policy
- 6 Honor code
- 7 General information

## 1 Presentation

The focus of this course will be the understanding of algorithms, that is the study of techniques for systematically solving given problems.

In order to fully benefit from this course, students are expected to only conduct and submit their own, personal work.

## 2 Teaching team

Details related to the instructor and Teaching Assistants (TAs) are summarized in the following table.

| Instructor and TA | Contact               | Office hours | Location |
|-------------------|-----------------------|--------------|----------|
| Manuel            | charlem@sjtu.edu.cn   | Appointment  | TBD      |
| Haoxiang          | iniesta8@sjtu.edu.cn, | TBA          | TBA      |
| Xinmiao           | yuxinmiao@sjtu.edu.cn | TBA          | TBA      |

## 3 Schedule

The fall semester is 14 weeks long, including one week for the finals and the national holidays.

Lectures:

- Tuesday 8:00 – 9:40
- Thursday 8:00 – 9:40
- Friday 8:00 – 9:40 (weeks 8 and 12)

Labs:

- Wednesday 18:20 – 20:20
- Thursday 18:20 – 20:20

## 4 Course content and objectives

This course has been tailored with three main goals in mind:

- Become familiar with the most common problems and algorithm paradigms
- Understand how to properly analyse and abstract a problem
- Be able to identify or design clear and efficient algorithms to solve a problem

Hence, at the end of this course, students should be provided with a solid basis for any further study in the field of algorithmic; In particular they should have developed the necessary skills to assess the validity and efficiency of some given solution to a problem.

These goals are fulfilled through the following course outcomes:

- Be able to write clean and clear pseudocode (chap. 1)
- Have a precise idea of the pros and cons for the most common data structures (chap. 1)
- Develop critical thinking abilities (chap. 1)
- Be able to assess the difficulty of a given problem, e.g belongs to P, NP, PSPACE (chap. 2)
- Know when and how to apply dynamic programming (chap. 3)
- Understand be benefits and drawback of randomized algorithms (chap. 5)
- Know how to use some existing mathematical result to design a algorithms (chap. 7)
- Understand the importance to properly prove the correctness and complexity of an algorithm (chap. 1-7)
- Be able to efficiently implement the most common algorithms (mainly labs)

The detailed organisation of this course is given as follows:

| <b>Weeks 1–7</b>        | <b>Weeks 8–13</b>        |
|-------------------------|--------------------------|
| 0. Course information   | 4. Network flow          |
| 1. Basics on algorithms | 5. Randomized algorithms |
| 2. Complexity theory    | 6. Mathematical problems |
| 3. Dynamic programming  | 7. More advanced topics  |
| <b>Midterm exam</b>     | <b>Final exam</b>        |

Although this course focuses on the construction, design, and analysis of algorithms, some basic programming skills will be necessary in order to complete the labs.

## 5 Grading policy

The final average will be composed of four “sub-grades”, apportioned as follows:

- Homework: 15%
- Labs: 10%
- Project: 25%
- Final exam: 25%
- Midterm exam: 25%

Any late submission will result in a 10% deduction per day from the grade of the corresponding work. After three days no submission will be accepted.

Any work submitted before the deadline and fully written in  $\text{\LaTeX}$  will be awarded a 10% bonus. Extra marks resulting from this bonus cannot lead a to grade larger than a full grade. This is not the case for other bonuses resulting from extra work, spotting major issues in the slides or assignments.

Algorithms must be written following the guidelines provided during the lectures. Any submission not respecting them will be ignored.

For the final grade a curve will be applied such that the median is in the range B – B+.

## 6 Honor code

It is of a major importance for any submitted work to be the result of one own research and understanding. In particular it is not acceptable to reuse the work from another student, or downloaded from the internet. Students can however help each others in an up-building way by sharing ideas and understanding on the course.

If in any case code or details from a textbook or internet is reused, the source should be clearly stated such as not to induce any possible confusion.

According to JI Honor Code copying the work of others will result in **severe penalties**.

## Exams

Only the following documents are allowed during the exams.

- The electronic version of the lecture slides with notes on them;
- The printed version of the lecture slides with notes on them;
- A mono or bilingual paper dictionary;

Any document, material, or mean of information and communication not explicitly listed above is strictly prohibited. In particular a **non-exhaustive** list of forbidden materials is as follows.

- Homework and labs (questions and answers);
- Notebooks or separate files containing notes;
- Calculator or any program allowing to run calculations;

## Group works

Students are fully responsible for the work they submit. In particular in case of plagiarism the whole group will be sent to Honor Council, not only the student who did plagiarise.

## 7 General information

The following references and links can be used to find information relevant to the course.

- This course is loosely based on the books *Algorithm Design* from J. Kleinberg and E. Tardos and *Introduction to Algorithms* from H. Cormen, C. Leiserson, R. Rivest, and C. Stein.
- Another major reference students are highly recommended to read is *The Art of Computer Programming* from Knuth.
- All the course related materials will be available on Canvas.
- The use of meta-search engines and English is highly recommended when searching information online;

To improve communication between the students and the teaching team please observe the following guidelines.

- Any student facing a special situation likely to impact his studies, such as serious illness or full time work, is expected to contact the instructor as early as possible in order to discuss it and see if any solution can be found.
- When sending an email related to this course please include the tag [VE477] in the subject e.g. Subject: [VE477] special request
- When contacting a TA for a grade issue or any other major problem send me a carbon copy (cc). Not doing it might result in omissions, not up-to-date grades etc...If such problem occurs and there is no record of the issue the request will be **automatically rejected**.
- Never attach a large file (> 2 MB) to an email, use Canvas Dropbox instead and only include a link in the email.
- Keep in touch with the teaching team, feedbacks and suggestions will be much appreciated.