



ÉCOLE
D'INGÉNIEURS
PARIS-LA DÉFENSE

ESILV – IBO – S7 – Sept. 2018: Dec. 2018

Advanced Data Structures and Algorithms

Class Chart v4.4

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1. Team

- **David Dupuis**, PhD student at CNAM and Data Scientist Researcher at Kwanko.
- **Thomas Raimbault**, Assistant Professor at ESILV, in charge of the Research Apprenticeship
- **Marcos Almeida Da Silva**

Office Hours

To discuss with the instructors please send in advance an email with explanations of your request; if necessary a meeting will be set up.

2. Syllabus

Chapter 1: Introduction and Analysis

Chapter 2: Arrays, Recursion, Sorting and Searching

Chapter 3: Linked Lists, Stacks and Queues

Chapter 4: Basic Trees & algorithms

Chapter 5: Advanced Trees & algorithms

Chapter 6: Basic Graphs & algorithms

Chapter 7: Advanced Graphs & algorithms

Chapter 8: Big Data algorithms

3. Class Overview

The following class is inversed which means the instructors will not be giving formal classes. Students will be acquiring and searching their own class material; whatever suits them best. They will receive enough guidelines to understand what is expected of them.

Starting at the second class, there will be a short online quiz at the beginning of each class. During the class there will be no workshops, students will be free to work on their class, their final project, ask questions or do something else.

Starting the third class, some students will be chosen by the instructor to pass a khôlle for which they will be graded.

Grades of quizzes, khôlles and the project will be summed up into a single final grade.

Class material is provided to help you understand what you need to learn throughout the course.

4. Quizzes

Starting the second class you will begin each class with a 7-minutes (may change) online quiz graded out of 10. You will, thus, need access to the Internet through your computer, tablet or smartphone. Quizzes of the morning classes at 8:30am will start at 9:00am.

5. Khôlles

They will start at the third class and be on Chapter 1 and 2.

During the class a few students, 2 or 4 **at a time** will be asked to pass a mock technical interview at the whiteboard, on paper or on their laptop. The khôlle is graded out of 20 and lasts about 20-30 minutes. The student will have to go as far as possible in the exercises and be able to explain everything that he is doing. He will be mainly graded on his reasoning capabilities and abilities to solve computer science problems. The instructor may assign you a challenge randomly, by choice or even let you choose the problem. The problem will likely be on the previous chapter, but the instructor is free to suggest a challenge from a past chapter.

You will be free to code in the language of your choice.

Every student will have 3 khôlles throughout the class.

Every khôlle will be structured like so:

1. Class question
2. Easy exercise
3. Medium exercise
4. Hard exercise

The instructor is at liberty to choose your grade based on your overall performance.

6. Project

Your choice of the project starts immediately. You are free to choose any one you want. It may be a game, a software, a sophisticated algorithm; it may be personal or a project you are working on at ESILV. You may also work on this project alone or with up to 2 collaborators.

It is not necessary to do this final project to pass this class if your quiz and khôlles grades are good enough; but it is of course recommended you motivate yourself to do so as it will enable you to learn more and complete your technical resume.

Your project will be graded out of 20 by your instructor. If you choose to work on a project you must:

- turn in continuous “reports” (using commits, and READMEs) of your work using GitHub (you can set this up during your first class)
- make a 3 minutes demo video of your work and share it online
- make a 4 minutes video presentation of your project and share it online. You must be able to explain the code and choices made, the challenges encountered and the solutions you have found and the possible improvements that can be made.

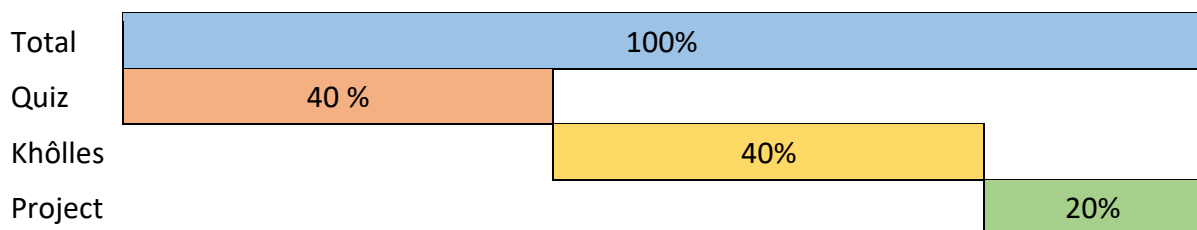
The final project must make use of advanced data structures and algorithms whether you had to code them yourself or work with them using a coding tool such as Neo4J, Boost, etc.

You are also free to explore advanced machine learning algorithms although they are not covered in this class. You may discuss project ideas with your instructor.

Please submit your project ideas before the end of September on this form: <https://forms.office.com/Pages/ResponsePage.aspx?id=rrzuiObW9067pEw09MLV4JfgffQJsmBDtxBSqQK8Nh1UM0VKs1MyN0VKRE5WRIkyQ0JBTE4wWTBRMi4u>

7. Grading

Every quiz grade except the worst one will count for your final grade. Your khôlles grade and project grade will also count.



Percentages may vary slightly.

8. Extra

8.1. Arriving late

Quizzes can be taken from anywhere but to be marked present in class you must arrive within 30 minutes of the beginning of the class. If you miss a khôlle because of this you will get a 0 on that khôlle. If your instructor accepts it, you may send him a message on Yammer to warn him you will be late for class.

8.2. Missing a class

If you miss a class, you must justify your absence with the administration not the instructor.

8.3. Cheating

Students caught cheating during a quiz will receive an immediate 0 on this quiz.