

Advanced Algorithms

Course level: Master

Course code: MLDM AA

ECTS Credits: 4.00

Course instructors: Amaury Habrard (UJM, Saint- Etienne)



Education period (Dates): 1st semester

Language of instruction: English

Expected prior-knowledge: Basics on analysis of algorithms, complexity, maths, graph theory and programming skills.

Aim and learning outcomes:

Introduction of advanced analysis for difficult algorithmic problems. The objective is to be able to detect hard problems and to design efficient solutions by dynamic programming, greedy approaches, appropriate heuristics or approximations.

Topics to be taught (may be modified)~20h:

- [Summary/recap on complexity and NP-complete problems.
- [Dynamic programming: characterisation, diverse problems.
- [Greedy algorithms: characterisation, diverse problems.
- [Approximate solutions for solving NP-complete problems (greedy/random/optimisation methods, heuristics, graph explorations and branch and bound, CSP)

Practical Laboratory Sessions~10h: Implementations of advanced algorithms (project).

Teaching methods: Lectures and lab classes.

Form(s) of Assessment: written exam (2/3), practical work (1/3)

Examination support: None

Literature and study materials:

Reference book:

- T. Cormen, C. Leiserson, and R. Rivest, "Introduction to Algorithms," The MIT Press, 1990.
- J. Kleinberg and E. Tardos , "Algorithm Design", Pearson International Edition, 2006.

Additional books:

- D.E. Knuth, "The Art of Computer Programming," , Vols. I, II, III, Addison-Wesley, 1981

Additional information:

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