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1. Introduction

In this document, you will find instructions to follow the course: "Optimization Methods for Data-driven Engineering Processes in Python". Please read it carefully and check it whenever you have a doubt.

Our classes will take place at [RE 20] - Tecnopolo - Ex Officine Reggiane - Padiglione 15. They consist of theory and practice. The practice consists of coding in the Python language the concepts we have learned. We will start coding from the first lecture onwards. For that, it is necessary to have:

- Basic knowledge of data types, data structures, control structures (if, while, etc.), functions, and basic algorithms (linear search, binary search, sorting). Basic knowledge of algorithmic complexity is a plus.
- Fundamentals of Linear Programming. Modeling with Linear Programs.

There will be a final exam. Check and follow the schedule below for more details about the topic of each lecture. I will also provide some slides and python programs in a Google Drive folder. All material will be shared in this folder, so be sure you have access to it.

2. Schedule

The course (given in English) topics in optimization methods taking advantage of what the Python language offers in terms of libraries and tools. It involves the modeling and resolution of real-world optimization problems. The course has 5 lectures of 2 or 3 hours each plus a final exam, according to the table below.

Schedule							
Week	**Day**	**Start**	**End**	**Hours**	**Total**	**Place**	**Lesson**
1	25-Nov	10:00	13:00	3	3	RE 20	Introduction to optimization and Python basics
	29-Nov	11:00	13:00	2	5	RE 20	Mathematical Programming in Python
2	02-Dec	10:00	13:00	3	8	RE 20	Solving knapsack problems
	06-Dec	11:00	13:00	2	10	RE 20	Solving cutting stock problems
3	09-Dec	10:00	13:00	3	13	RE 20	Solving traveling salesman problems
	13-Dec	11:00	13:00	2	15	RE 20	Student projects/exam
Total				**15**			

The rooms where the lectures will take place, at [RE 20] - Tecnopolo - Ex Officine Reggiane - Padiglione 15, are:

- Monday 11/25/2024: room M.0.2.
- Friday 11/29/2024: room: M.0.2.

- Monday 12/02/2024: room M.0.2.
- Friday 12/06/2024: room M.0.2.
- Monday 12/09/2024: room: M.0.2.
- Friday 12/13/2024: room: M.0.2.

3. Evaluation and grading

The course will be evaluated by a student project consisting in solving a practical problem with real-world/random data using the optimization algorithms discussed during the course.

It will consist of a project to be solved in groups using the Python language to solve the given problem over different instances.

The grading will be given according to the standard method and scale used by UNIMORE.

4. Final considerations

If at any moment you have doubts about the course and lectures, feel free to contact me by email: taq@ufcat.edu.br or ask me during the lectures. I will reserve a time at the end of each lecture to answer questions.

5. Bibliography

- VANDERPLAS, J. Python Data Science Handbook. O'Reilly Media, Sebastopol, 2016.
- CONFORTI, M.; CORNUEJOLS, G.; ZAMBELLI, G. Integer Programming. Switzerland: Springer International Publishing, 2014.
- CORMEN, T. H.; LEISERSON, C. E.; RIVEST, R. L.; STEIN. C. Introduction to algorithms. MIT Press, Cambridge, 2001.
- TALBI, E.-G. Metaheuristics: From Design to Implementation. New Jersey: John Wiley & Sons, 2009.
- WOLSEY, L. A. Integer Programming. John Wiley and Sons, New York, 1998.