P.PORTO ESCOLA SUPERIOR DE TECNOLOGIA E GESTÃO	Evaluation type Practical Work	Academic Year 2023/2024	Date 28-05-2024
	Degree Degree in Informatics Engineering		Submission date (see Moodle)
	Course Title Algorithm Analysis and Optimization		Presentation date (see Moodle)

Observations
This practical work is intended to all students enrolled in the curricular unit independently of the evaluation option they chose.

- Students should get together in groups of 4 elements to divide, in the best way, the tasks defined in this work. Exceptionally, and only when justified, groups with other number of elements may be considered.
- A link will be available on Moodle for the registration of students in the various groups. The members of the same group can be assigned different grades. The final definition of the groups will be also published in Moodle.
- Each group must make a presentation of their practical work. The schedule of the will be published in Moodle.

Objectives

This work consists in:

- Using heurist methods to develop algorithms for the solution of the Uncapacitated Facility Location Problem (UFLP).
- Applying knowledge about algorithmic analysis to evaluate the performance of the implemented algorithms.

Tasks

The practical work consists on the following tasks:

1. **Bibliographic research about the Uncapacitated Facility Location Problem (UFLP)** - This task consists in carrying out a literature research about the UFLP through books and scientific papers published on the subject. This research will allow for a theoretical introduction of the state-of-the-art for the UFLP for any typology of graphs and to know the different heuristic approaches for its resolution.
2. **Implementation of an algorithm to solve the Uncapacitated Facility Location Problem (UFLP)**- This task consists in the analysis, development and implementation of algorithms for the solution of thee UFLP. The working group must use heurist approaches to solve the UFLP and implement the associated algorithms in a programming language of their choice.
3. **Performance analysis of the algorithm used** - This task consists on the following analysis:
    - Computational times;
    - Solution quality;
    - Comparison of the results obtained by the implemented algorithms.
4. **Preparation of the final report of the practical work** - This task consists in writing a report describing all the work done, namely, the summary, the theoretical introduction, the IO methodology used, the TSP algorithm, the results obtained and the conclusions. The source code of the implemented algorithm and the due comments must be included in the final report of the practical work (template available in Moodle of the curricular unit), in the section regarding annexes.
5. **Final report delivery** - The final report of the practical work is the only document (in .pdf format) that must be submitted on the Moodle platform by the representative of the working group for evaluation of the practical component of this course.

Notes

These will be made available on Moodle in due course:

- UFLP instance files to test the implemented algorithms.
- The instances optimal values are listed in the file "optimal.txt" included in the compressed file "FicheirosTeste.zip"
- Template of the report to be used in task 4.
- Other documents considered useful in this work.