Project for the Operational Research course.
Projects, proposed by groups of 1 to 3 people, must be sent by e-mail to the course lecturers by the scheduled examination date.

If the projects are considered sufficient, students will be called (in person) for the oral examination (within a week approx.). During the oral examination the project will be explained in detail. In addition, questions relating to all course topics will be addressed.

Students must choose one of the following guidelines for their project.

Project Number 1:

A company must locate deposits on the national territory.
Deposits must cover the entire national territory. Considering an Italian population of about 60 million inhabitants, each deposit cannot serve more than 5 million people.
Given this generic scenario (but any other territory can be chosen), the work involves:

1) Identify a company and a real application scenario, adhering to the general scenario for which to decline the project.
2) Describe in detail the identified scenario.
3) Design and implement a mathematical programming model capable of solving the given problem or its simplification.
4) Develop a heuristic approach to the problem.
5) Develop a meta-heuristic approach to the problem.
6) Create several instances to test the developed approaches.
7) Carry out computational tests starting from the identified test cases.
8) Comment the results.
9) The report describing the work done cannot exceed 10 pages.

The project is considered sufficient even if all the required approaches are not implemented.
To aim for the highest grade, however, it is necessary to implement an exact approach, a heuristic approach and a meta-heuristic approach, using both Excel and/or Python for the various techniques.

Project Number 2:

A company must start the production of goods on the national territory.
The number of goods to be produced for the entire Italian population is represented by integer numbers.
All the following aspects need to be considered:
The procurement of raw materials; production times and costs; the environmental sustainability of the production process; corporate profits.
Given this generic scenario, the work involves:

1) Identify a company and a real application scenario, adhering to the general scenario for which to decline the project.
2) Describe in detail the identified scenario.
3) Design and implement a mathematical programming model capable of solving the given problem for each single objective.
4) Solve the problem taking into account the different objectives and constraints.
5) Calculate the Pareto frontier for the problem. For all objectives simultaneously or for a subset of objectives.
6) Create several instances to test the developed approaches.
7) Carry out computational tests starting from the identified test cases.
8) Comment on the results.
9) The report describing the work done cannot exceed 10 pages.

The project is considered sufficient even if all the required points are not achieved.
To aim for the highest grade, however, it is necessary to work on all the required points, using both Excel and Python for the various steps.