



# Master of Science in Operations Research, Combinatorics and Optimization

Université Grenoble Alpes-IM2AG / Grenoble INP-Ensimag

In the current context of globalization and competition, optimization plays a major role in all sectors of the industry. As a consequence, operations research and combinatorial optimization are very active domains of research both in R&D labs and in academia. In Grenoble, in particular, several teams of researchers from Grenoble INP, UGA, CNRS and INRIA are recognized worldwide for their work in this area. The methods and tools of the field range from applied mathematics to computer science and a deep expertise of these area are needed to develop advanced solutions. This master program aims at preparing students to contribute actively to the development of the field, both in academia and in the industry.

- International Master program, taught in English
- Joint program between Université Grenoble Alpes UFR IM<sup>2</sup>AG and Grenoble INP Ensimag



## Scientific objectives:

- Study of advanced and efficient methods and tools of Operations Research, Combinatorics and Optimization (Mathematical programming, Graph theory, Complexity theory, Stochastic programming, heuristics, approximation algorithms, Robust optimization...)
- Emphasis on the use of these methods to implement efficient solution techniques to complex industrial applications (in supply chain management, scheduling, transport ...)
- Preparation for research positions (in industry and academia)

## Professional objectives:

At the end of the program, the students should be able to pursue a career in research (academic or industrial PhD), or to join major research and development departments or consulting companies in optimization. They might also build upon their ability to analyze operational problems methodologically to join less specialized companies and act as key actors in performance management: either by interfacing with consulting firms or by developing in-house solutions. In the long run, students who are moving towards industrial careers, strengthened by their experience in improving business performances and by the development of business-specific knowledge, should naturally reach decision-making positions with a high level of responsibility.

### Related research labs in Grenoble:

G-SCOP, LJK, LIG, IF and also Inria research centre.





## Academic program

### Common core

- Advanced models and methods in operations research (6 ECTS)
- Combinatorial optimization and graph theory (6 ECTS)
- Optimization under uncertainty (6 ECTS)

### Elective courses

Choose a total of 12 ECTS among the following courses:

- Logistic and transport (3 ECTS)
- Scheduling (3 ECTS)
- Graph and discrete structures (3 ECTS)
- Advanced heuristic and approximation algorithms (3 ECTS)
- Advanced mathematical programming methods (3 ECTS)
- Efficient methods in optimization (3 ECTS)
- Parallel systems (6 ECTS)
- Academic and industrial challenges (3 ECTS)

### Master thesis (30 ECTS)

A five-month internship is compulsory. It can be done in a R&D department of a private company or in an academic laboratory.

## ■ Admission:

To be admitted in the program, candidates shall have previously completed the first year of a master program (M1) in Computer science, Applied Mathematics or Industrial Engineering, or shall hold an equivalent degree. Basic skills in the following domains would largely be appreciated: probability theory, graph theory, linear programming, branch and bound. Candidates can contact the persons in charge of the master program to have references of books and/or articles on these domains to prepare at best.

Admission webpage: <https://relint.ensimag.fr/MainEn/Admission>

## Academic supervisors:

Marie-Laure ESPINOUSE  
Gautier STAUFFER

### Registrar's office:

- Elena LEIBOWITCH (Ensimag)
- Bérengère DUC (UGA)

## Application Deadlines

Non-European Students:

Mid-March

European students:

Mid-May

### Contact:

[im2ag-service-formation@univ-grenoble-alpes.fr](mailto:im2ag-service-formation@univ-grenoble-alpes.fr)

## Tuition and fees

Approximately 500 Euros / Year

Note that tuition fees are highly subsidized by the French Government.

### More information:

<https://master-informatique.univ-grenoble-alpes.fr/>

<http://orco.imag.fr/>