

Master in Mathematics and applications

Operations Research, Combinatorics and Optimization (ORCO)

Presentation

Semester 9 corresponds to the specialization training and semester 10 consists of a practicum in a company or laboratory of 5 to 7 months, which represents 27 European Credit Transfer and Accumulation System credits. The master in Operations research, combinatorics and optimization is one of the possible specializations for the second year of the master of science in Computer science. The courses are taught in English.

Objectives

The scientific objectives are :

- To train students in the foundations and methods of Operational research (mathematical programming, graph theory, complexity, stochastic programming, heuristics, approximation algorithms etc)
- To prepare students to use and develop these methods to solve complex industrial applications (supply chain, scheduling, transport, revenue management, etc.) and implement the corresponding software solutions

Students leaving this course equipped to, according to their preferences, move towards the research professions (academic or industrial thesis), enter, as a specialist engineer, major research and development departments in optimization (SNCF, IBM, Air France, Amadeus etc) or enter optimization consulting firms (Eurodécision, Artelys etc). They will also be able to enter less specialized companies by highlighting their ability to methodologically analyse operational problems, thus demonstrating that they are potential key elements in the improvement of the company's performance (by linking up with specialized firms or developing in-house methods).

In the longer term, students who are oriented towards the industrial world should be able, with their experience in improving company performance and good "business" knowledge, to naturally access decision-making positions at high levels of responsibility.

Registration and scholarships

The first year master's is accessible to candidates according to their transcripts (and/or interview) :

- Proof of a national degree conferring the degree of bin a field compatible with that of the master's degree
- Or by validation of studies or acquired experience according to the conditions determined by the university or the training

The second year master's is accessible to candidates according to their transcripts (and/or interview) :

- Having validated the first year of a compatible course - or by validating studies or acquired experience according to the conditions determined by the university or the training

Public continuing education : You are in charge of continuing education :

- if you resume your studies after 2 years of interruption of studies
- or if you followed a formation under the regime formation continues one of the 2 preceding years
- or if you are an employee, job seeker, self-employed

If you do not have the diploma required to integrate the training, you can undertake a [validation of personal and professional achievements \(VAPP\)](#).

Would you like to apply and register ? Please note that the procedure differs depending on the degree, the diploma obtained, or the place of residence for foreign students

- **You are a non-EU citizen, resident in (you live in one of these countries) :**

Algeria, Argentina, Benin, Brazil, Burkina Faso, Cameroon, Chile, China, Colombia, Comoros, Congo, Egypt, Indonesia, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mexico, Morocco, Peru, Russia, Senegal, South Korea, Syria, Taiwan, Togo, Tunisia, Turkey, Vietnam.

[Apply for studies in France](#) and [on FSA](#)

For other applicants : [Apply Now](#)

Further studies

This program allows students to write a thesis. Its strong industrial basis especially allows students to find industrial theses with very good conditions (CIFRE, contract...)

Practicals informations :

- > **School :** Grenoble INP, Institut d'ingénierie et de management, UFR IM2AG (informatique, mathématiques et mathématiques appliquées)
- > **Duration :** 2 years
- > **Course type :** Initial and Continuing Education
- > **Location(s) :** Grenoble - University campus
- > **Contacts :**

Programme director

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Program

Master Industrial and applied math 1st year

Semester 7

UE Partial differential equations and numerical methods	6 ECTS	54h
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UE Signal and image processing	6 ECTS	54h
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UE Geometric modelling	6 ECTS	54h
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1 option (s) to choose from 2

UE French as a foreign language
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UE English

Semester 8

UE Computing science for big data and HPC	6 ECTS	54h
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UE Project	3 ECTS	
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UE Internship	3 ECTS	
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UE Numerical optimisation	6 ECTS	54h
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3 option (s) to choose from 4

UE Computer algebra and cryptology	6 ECTS	30h
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UE Variational methods applied to modelling	6 ECTS	54h
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UE 3D Graphics	3 ECTS	36h
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UE Operations research	3 ECTS	36h
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4 option (s) to choose from 9

UE Logistic and transport	3 ECTS	18h
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UE Scheduling	3 ECTS	18h
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UE Graph and discrete structures	3 ECTS	18h
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UE Advanced heuristic and approximation algorithms	3 ECTS	18h
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UE Advanced mathematical programming methods	3 ECTS	18h
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UE Efficient methods in optimization	3 ECTS	18h
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UE Parallel systems	6 ECTS	36h
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UE Academic and industrial challenges	3 ECTS	18h
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UE SAT/SMT Solving	3 ECTS	18h
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Semester 10

UE Practicum	30 ECTS	
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Master in General mathematics 1st year

Semester 7

UE Algebra 1	9 ECTS	71,5h
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UE Holomorphic functions	6 ECTS	48,9h
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UE Ordinary differential equations	9 ECTS	71,5h
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UE Scientific English	3 ECTS	24h
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UE Statistics	3 ECTS	33h
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Semester 8

UE Study and research work	3 ECTS	25h
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UE Algebra 2	6 ECTS	48,5h
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UE Differential and dynamic geometry	6 ECTS	48,5h
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UE Functional Analysis	6 ECTS	48,5h
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UE Stochastic processes	6 ECTS	48,5h
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UE Introduction to cryptology	3 ECTS	33h
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Master 2nd year

Semester 9

UE Advanced models and methods in operations research	6 ECTS	36h
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UE Combinatorial optimization and graph theory	6 ECTS	36h
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UE Optimization under uncertainty	6 ECTS	36h
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