

# Operations Research, Combinatorics and Optimization (ORCO)

Master in Mathematics and applications



Duration  
2 years



Component  
Grenoble  
INP, Institut  
d'ingénierie et  
de management  
- UGA, UFR  
IM2AG  
(informatique,  
mathématiques  
et  
mathématiques  
appliquées)



Language(s) of  
instruction  
English

## 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.

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.

**International education** : Internationally-oriented programmes

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## International dimension

Internationally oriented training

## Organisation

## Admission

### Access conditions


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).

### Candidature / Application

Do you want to apply and register? Note that the procedure differs depending on the degree considered, the degree obtained, or the place of residence for foreign students.

 Find out which procedure applies to me and apply

### Fees

Tuition fees : 243 €

## And after

### 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...)

## Useful info

### Contacts


#### Program director

Matej Stehlik

 [matej.stehlik@univ-grenoble-alpes.fr](mailto:matej.stehlik@univ-grenoble-alpes.fr)

#### Program director

Van Dat Cung

 [van-dat.cung@grenoble-inp.fr](mailto:van-dat.cung@grenoble-inp.fr)

#### Program administration

Cecile Gros

 [cecile.gros@univ-grenoble-alpes.fr](mailto:cecile.gros@univ-grenoble-alpes.fr)

### Course location(s) - City

 Grenoble

## Campus

 Grenoble - University campus

# Program

## Master Industrial and applied math 1st year

### Semester 7

	Nature	CM	TD	TP	Crédits
UE Partial differential equations and numerical methods	Teaching Unit (UE)	18h	18h	18h	6 credits
UE Signal and image processing	Teaching Unit (UE)		4,5h	16,5h	6 credits
UE Geometric modelling	Teaching Unit (UE)	16,5h	4,5h	33h	6 credits
UE French as a foreign language	Teaching Unit (UE)				
UE English	Teaching Unit (UE)				

### Semester 8

	Nature	CM	TD	TP	Crédits
UE Computing science for big data and HPC	Teaching Unit (UE)			18h	6 credits
UE Project	Teaching Unit (UE)				3 credits
UE Internship	Teaching Unit (UE)				3 credits
UE Numerical optimisation	Teaching Unit (UE)			18h	6 credits
UE Computer algebra and cryptology	Teaching Unit (UE)			15h	6 credits
UE Variational methods applied to modelling	Teaching Unit (UE)	18h	18h	18h	6 credits
UE 3D Graphics	Teaching Unit (UE)	18h	18h		3 credits
UE Operations research	Teaching Unit (UE)	15h	18h	3h	3 credits

## Master in General mathematics 1st year

### Semester 7

	Nature	CM	TD	TP	Crédits
UE Algebra 1	Teaching Unit (UE)	26h	45,5h		9 credits
UE Holomorphic functions	Teaching Unit (UE)	19,9h	29h		6 credits
UE Ordinary differential equations	Teaching Unit (UE)	26h	45,5h		9 credits
UE Scientific English	Teaching Unit (UE)		24h		3 credits
UE Statistics	Teaching Unit (UE)				3 credits

### Semester 8

	Nature	CM	TD	TP	Crédits
UE Study and research work	Teaching Unit (UE)		25h		3 credits
UE Algebra 2	Teaching Unit (UE)	19,5h	29h		6 credits
UE Differential and dynamic geometry	Teaching Unit (UE)	19,5h	29h		6 credits
UE Functional Analysis	Teaching Unit (UE)	19,5h	29h		6 credits
UE Stochastic processes	Teaching Unit (UE)	19,5h	29h		6 credits
UE Introduction to cryptology	Teaching Unit (UE)	15h	9h	9h	3 credits

## Master 2nd year

### Semester 9

	Nature	CM	TD	TP	Crédits
UE Advanced models and methods in operations research	Teaching Unit (UE)	36h			6 credits

UE Combinatorial optimization and graph theory	Teaching Unit (UE)	36h				6 credits
UE Optimization under uncertainty	Teaching Unit (UE)	36h				6 credits
UE Logistic and transport	Teaching Unit (UE)	18h				3 credits
UE Scheduling	Teaching Unit (UE)	18h				3 credits
UE Graph and discrete structures	Teaching Unit (UE)	18h				3 credits
UE Advanced heuristic and approximation algorithms	Teaching Unit (UE)	18h				3 credits
UE Advanced mathematical programming methods	Teaching Unit (UE)	18h				3 credits
UE Efficient methods in optimization	Teaching Unit (UE)	18h				3 credits
UE Parallel systems	Teaching Unit (UE)	36h				6 credits
UE Academic and industrial challenges	Teaching Unit (UE)	18h				3 credits
UE SAT/SMT Solving	UE	6h	6h	6h		3 credits

## Semester 10

	Nature	CM	TD	TP	Crédits
UE Practicum	Teaching Unit (UE)				30 credits