

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.

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 \(VAPP\)](#).

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](#)

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 :

- > Component : 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

Program director

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Program

Master Industrial and applied math 1st year

Semester 7

UE Partial differential equations and numerical methods	6 ECTS
UE Signal and image processing	6 ECTS
UE Geometric modelling	6 ECTS
1 option(s) to choose from 2	
UE French as a foreign language	
UE English	

UE Computing science for big data and HPC	6 ECTS
UE Project	3 ECTS
UE Internship	3 ECTS
UE Numerical optimisation	6 ECTS
3 option(s) to choose from 4	
UE Computer algebra and cryptology	6 ECTS
UE Variational methods applied to modelling	6 ECTS
UE 3D Graphics	3 ECTS

Semester 8

UE Operations research 3 ECTS

Semester 10

UE Practicum 30 ECTS

Master in General mathematics 1st year

Semester 7

UE Algebra 1 9 ECTS

UE Holomorphic functions 6 ECTS

UE Ordinary differential equations 9 ECTS

UE Scientific English 3 ECTS

UE Statistics 3 ECTS

Semester 8

UE Study and research work 3 ECTS

UE Algebra 2 6 ECTS

UE Differential and dynamic geometry 6 ECTS

UE Functional Analysis 6 ECTS

UE Stochastic processes 6 ECTS

UE Introduction to cryptology 3 ECTS

Master 2nd year

Semester 9

UE Advanced models and methods in operations research 6 ECTS

UE Combinatorial optimization and graph theory 6 ECTS

UE Optimization under uncertainty 6 ECTS

4 option(s) to choose from 9

UE Logistic and transport 3 ECTS

UE Scheduling 3 ECTS

UE Graph and discrete structures 3 ECTS

UE Advanced heuristic and approximation algorithms 3 ECTS

UE Advanced mathematical programming methods 3 ECTS

UE Efficient methods in optimization 3 ECTS

UE Parallel systems 6 ECTS

UE Academic and industrial challenges 3 ECTS

UE SAT/SMT Solving 3 ECTS
