

Master in Computer science

Operations Research, Combinatorics and Optimisation (ORCO) 2nd year

Presentation

Semester 9 corresponds to the specialization training, semester 10 consists of a practicum in a company or laboratory of 5 to 7 months, which represents 30 European credit transfer and accumulation system credits.

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) and 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 departing from this course intend to, depending on their preferences :

- Orient themselves towards the research professions (academic or industrial thesis)
- Enter, as a specialist engineer, major research and development services in optimization (SNCF, IBM, Air France, Amadeus etc) or enter consulting firms in optimization (Eurodécision, Artelys etc)

They will also be able to enter less specialized companies by highlighting their ability to methodologically analyse operational problems and thus displaying themselves as 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.

The course is labelled "Core AI" by [MIAI](#).

Registration and scholarships

Access conditions

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 \(VAPP\)](#)

skin.odf-uga:SKIN_ODF_CONTENT_PROGRAM_CANDIDATURE_LABEL

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](#)

Prerequisites

Language requirements :

- Students are required to provide evidence of Competence in English.
English scores required for the MSIAM, programs: TOEFL IBT 78, CBT 210, Paper 547 / TOEIC 700 / Cambridge FCE / IELTS 6.0 min.
This is equivalent to CEFR level B2.

If you have successfully completed a degree (or equivalent) course at a University in one of the following countries then you meet the English requirement automatically: Australia, Canada, Guyana, Ireland, New Zealand, South Africa, United Kingdom, United States of America, West Indies.

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 : UFR IM2AG (informatique, mathématiques et mathématiques appliquées), Grenoble INP - Ensimag (Informatique, mathématiques appliquées et télécommunications), UGA
- > level : Bacalauréat +5
- > Duration : 1 year
- > Course type : Initial and Continuing Education
- > Location(s) : Grenoble - University campus

Contacts

Program director

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Program

Program under construction - awaiting CFVU vote

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
UE Constraint Programming, applications in scheduling	3 ECTS
UE Graphs and discrete structures	3 ECTS
UE Advanced heuristic and approximation algorithms	3 ECTS
UE Advanced mathematical programming methods	3 ECTS
UE Academic and industrial challenges	3 ECTS
UE Transport Logistics and Operations Research	6 ECTS
UE SAT/SMT solving	3 ECTS
UE Advanced parallel system	6 ECTS
UE Multi-agent systems	3 ECTS
UE Fundamentals of Data Processing and Distributed Knowledge	6 ECTS
UE Scientific Methodology, Regulatory and ethical data usage	6 ECTS
UE Large scale Data Management and Distributed Systems	6 ECTS
UE Cryptographic engineering, protocols and security models, data privacy, coding and applications	6 ECTS
UE From Basic Machine Learning models to Advanced Kernel Learning	6 ECTS
UE Mathematical Foundations of Machine Learning	3 ECTS
UE Learning, Probabilities and Causality	6 ECTS
UE Statistical learning: from parametric to nonparametric models	6 ECTS
UE Efficient methods in optimization	3 ECTS

Semester 10

UE Practicum	30 ECTS
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Master 2nd Graduate School program

Semester 9

UE GS_MSTIC_Research ethics	6 ECTS
UE Advanced models and methods in operations research	6 ECTS
UE Combinatorial optimization and graph theory	6 ECTS
UE Optimization under uncertainty	6 ECTS
UE Constraint Programming, applications in scheduling	3 ECTS
UE Graphs and discrete structures	3 ECTS
UE Advanced heuristic and approximation algorithms	3 ECTS
UE Advanced mathematical programming methods	3 ECTS
UE Academic and industrial challenges	3 ECTS
UE Transport Logistics and Operations Research	6 ECTS

Semester 10

UE Practicum	30 ECTS
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