

Master in Mathematics and applications

Cybersecurity

Presentation

The global economic impact of losses due to cybercrime amounts to hundreds of billions of euros per year (\$445 billion according to the McAfee/CSIS study of 2014) with a strong increase in attacks, especially for identity theft and digital data theft, as well as malicious attacks.

Protection against these vulnerabilities includes :

- Robustness to cyber attacks of sensitive infrastructure (e.g. stuxnet)
- Robustness of security components against software vulnerabilities and data leaks (e.g. heartbleed)
- Protection of privacy and security of cloud infrastructure
- Robust design and evaluation of safety components
- Fault detection in protocols or software and hardware components

The topics covered in the training cover the complementary areas of Cybersecurity, including cryptology, forensics, and privacy, in particular for embedded systems and distributed architecture.

The objective of this program is to train cybersecurity experts (including data privacy aspects) with a bac + 5 degree, able to evolve immediately in an industrial environment and who can also pursue a thesis.

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

Registration and scholarships

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 bachelor in 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 (the course is accessible from the two common trunks General mathematics and Applied mathematics provided that the students have taken the appropriate optional courses)
 - Or by validation of 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

Depending on the nature of their practicum, students may wish to pursue research in a doctoral thesis.

Practicals informations :

- > Component : UFR IM2AG (informatique, mathématiques et mathématiques appliquées), Grenoble INP - Ensimag (Informatique, mathématiques appliquées et télécommunications)
- > level : Baccalaureate +5
- > Duration : 2 years
- > Course type : Initial and Continuing Education
- > Location(s) : Grenoble - University campus

Contacts

Program director

Pernet Clement
Clement.Pernet@univ-grenoble-alpes.fr

Mounier Laurent
Laurent.Mounier@univ-grenoble-alpes.fr

Administrative contact

Beaujolais Carine
carine.beaujolais@univ-grenoble-alpes.fr
Phone 04 57 42 25 74

Ros Elise
elise.ros@grenoble-inp.fr

Program

Program under construction - awaiting CFVU vote

Master applied mathematics 1st year

Semester 7

UE Object-oriented and software design 3 ECTS

UE Partial differential equations and numerical methods 6 ECTS

- Partial differential equations and numerical methods
- Partial differential equations and numerical methods complementary

UE Signal and image processing 6 ECTS

UE Geometric modelling 6 ECTS

UE English 3 ECTS

UE Applied probability and statistics 6 ECTS

UE Dynamic systems 3 ECTS

UE Instability and Turbulence 3 ECTS

UE Turbulent fluid dynamics 3 ECTS

Semester 8

UE Computing science for big data and HPC 6 ECTS

- HPC
- Introduction to database

UE Project 3 ECTS

UE Internship 3 ECTS

UE Numerical optimisation 6 ECTS

2 option(s) to choose from 2

UE Operations Research (AM) 6 ECTS

- UE Operations Research 3 ECTS
- Operations Research Complementary

UE Introduction to cryptology (AM) 6 ECTS

- UE Introduction to cryptology 3 ECTS
- Introduction to cryptology complementary

UE 3D Graphics (AM) 6 ECTS

- UE 3D graphics 3 ECTS
- 3D Graphics Complementary

UE Turbulences 6 ECTS

- Plasmas Astrophysiques et de Fusion
- Experimental techniques in fluid mechanics

UE Statistical analysis and document mining 6 ECTS

- Statistical analysis and document mining
 - Statistical analysis and document mining Complementary 3 ECTS

UE Variational methods applied to modelling 6 ECTS

- Variational methods applied to modelling
- Variational methods applied to modelling Complementary

Master applied mathematics 1 st year Graduate School program

Semester 7

UE Object-oriented and software design 3 ECTS

UE Partial differential equations and numerical methods 6 ECTS

- Partial differential equations and numerical methods
- Partial differential equations and numerical methods complementary

UE Signal and image processing 6 ECTS

UE Geometric modelling 6 ECTS

UE Applied probability and statistics 6 ECTS

UE English 3 ECTS

Semester 8

UE Computing science for big data and HPC 6 ECTS

- HPC
- Introduction to database

UE Project 3 ECTS

UE Internship 3 ECTS

UE Numerical optimisation 6 ECTS

UE GS_MSTIC_Scientific approach 6 ECTS

1 option(s) to choose from 1

UE Operations Research (AM) 6 ECTS

- UE Operations Research 3 ECTS
- Operations Research Complementary

UE Introduction to cryptology (AM) 6 ECTS

- UE Introduction to cryptology 3 ECTS
- Introduction to cryptology complementary

UE 3D Graphics (AM) 6 ECTS

- UE 3D graphics 3 ECTS
- 3D Graphics Complementary

UE Turbulences	6 ECTS
- Plasmas Astrophysiques et de Fusion - Experimental techniques in fluid mechanics	
UE Variational methods applied to modelling	6 ECTS
- Variational methods applied to modelling - Variational methods applied to modelling Complementary	
UE Statistical analysis and document mining	6 ECTS
- Statistical analysis and document mining - Statistical analysis and document mining Complementary	3 ECTS

Master general mathematics 1st year

Semester 7

UE Algebra	9 ECTS
UE Holomorphic functions	6 ECTS
UE Probabilities	9 ECTS
UE Analysis	9 ECTS

Semester 8

UE Study and research work	6 ECTS
3 option(s) to choose from 3	
UE Effective algebra and cryptographie	6 ECTS
UE Compléments sur les EDP	6 ECTS
UE Differential geometry	6 ECTS
UE Markov process	6 ECTS
UE Galois theory	6 ECTS
UE Operations Research (AM)	6 ECTS
- UE Operations Research - Operations Research Complementary	3 ECTS
1 option(s) to choose from 1	
UE English S8	3 ECTS
UE Opening UE (only if C1 level in English reached)	3 ECTS

Master 2nd year

Semester 9

UE Software security, secure programming and computer forensics	3 ECTS
UE Security architecture	6 ECTS

UE Cryptographic engineering, protocols and security models, data privacy, coding and applications	6 ECTS
UE Threat and risk analysis, IT security audit and norms	3 ECTS
UE Physical Security : Embedded, Smart Card, Quantum & Biometrics	6 ECTS
1 option(s) to choose from 2	
UE Advanced cryptology	6 ECTS
UE Advanced security	6 ECTS

Semester 10

UE Research practicum (in company or laboratory)	30 ECTS
---	---------

Master 2nd Graduate School program

Semester 9

UE Software security, secure programming and computer forensics	3 ECTS
UE Cryptographic engineering, protocols and security models, data privacy, coding and applications	6 ECTS
UE Threat and risk analysis, IT security audit and norms	3 ECTS
UE Physical Security : Embedded, Smart Card, Quantum & Biometrics	6 ECTS
UE GS_MSTIC_Research ethics	6 ECTS
1 option(s) to choose from 1	
UE Advanced cryptology	6 ECTS
UE Advanced security	6 ECTS

Semester 10

UE Research practicum (in company or laboratory)	30 ECTS
---	---------