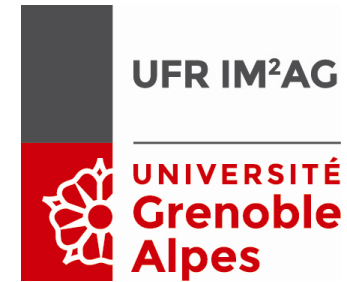


Master of Science in Industrial and Applied Mathematics (MSIAM)

**Opening Orientation Meeting
September 20, 2018**

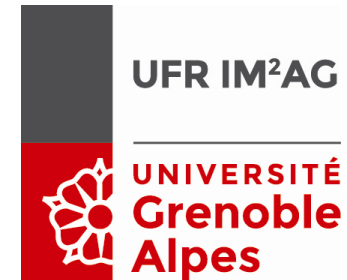
**Jean-Baptiste Durand (Grenoble INP) –
Edouard Oudet (UGA)**



WELCOME to MSIAM!

Aims of the meeting

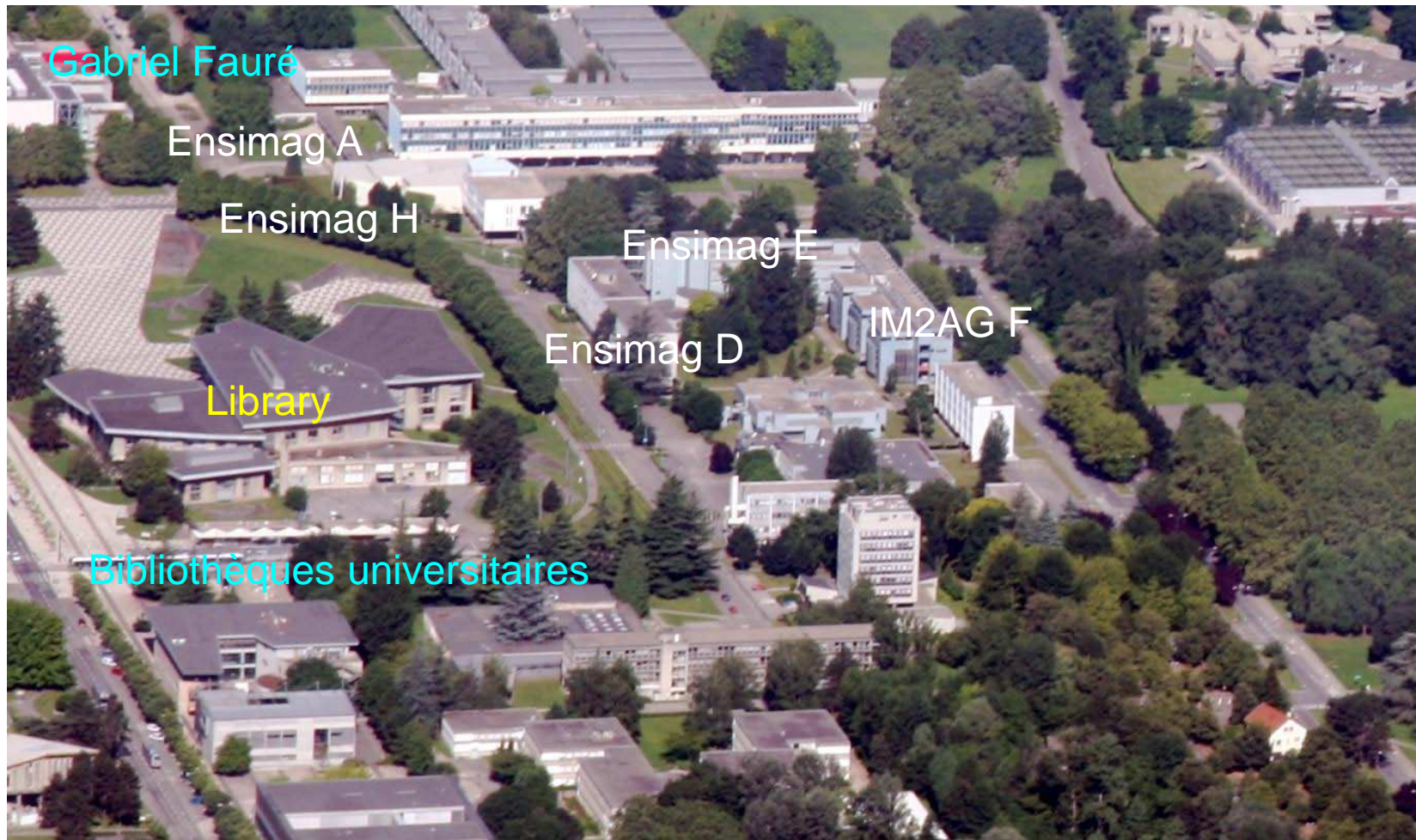
- Provide information on practical matters regarding:
 - academic tracks
 - choice of courses
 - class schedules
 - master thesis project
 - ...
- To meet each other



Academic and administrative staff

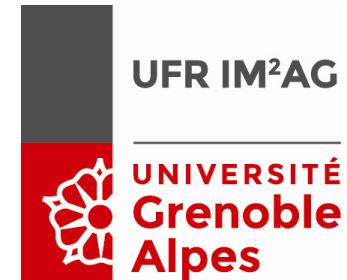
- Academic directors
 - edouard.oudet@univ-grenoble-alpes.fr: Head of MSC1 track
 - jean-baptiste.durand@univ-grenoble-alpes.fr: Head of DS tracks
- Administrative secretaries
 - sylvia.schaal@grenoble-inp.fr: Grenoble INP-Ensimag
 - carine.beaujolais@univ-grenoble-alpes.fr: UGA UFR IM²AG
- Whole staff: msiam2@imag.fr

Where are we?





Registration (reminders)



- MSIAM is a joint academic program between Grenoble INP (Ensimag) and Université Grenoble Alpes (UGA-UFR IM²AG)
- Students from UGA: register at UGA IM²AG (Carine, “scolarité”)
- Students from INP: register at INP Ensimag (Sylvia, room D101bis)

First semester: September to January

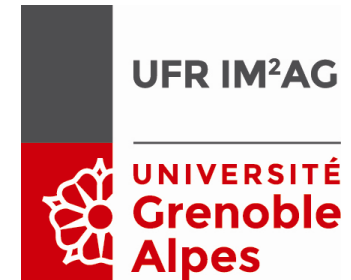
- 30 ECTS scientific courses (3 or 6 ECTS each)
- **language course:** French or English (see slide $n+2$)
- Two periods: Fall and Winter
- Exams: January 28-February 15, 2019 (probably sooner). Second session: **April 15-19, 2019.**

Second semester: February to June

- Master thesis project (30 ECTS)
- Project defenses: End of June or beginning of September 2019
- For an application to PhD research grants from doctoral school MSTII, defense in June is mandatory (2-3 positions, a lot of other funding possibilities).



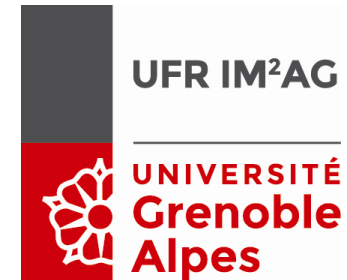
3rd year Ensimag students



- 3rd year Ensimag students may choose (or not choose) some additional registration to get the Master's degree
- **Only if they renounce the Master's degree:**
 - They may choose to earn 24 ECTS instead of 30
- **In every case:**
 - They must earn the following ECTS at Ensimag: 2nd year internship defense, REX (Return of Experience), Innovation and Management, English.



Language courses



FLE: Français Langues Etrangères

- Optional for non-Erasmus international students who just arrived in France - Registration last Monday.
- Once a week, 2h.
- Optional for Erasmus students: contact their University Foreign Office to register
 - UGA: Berengere.Duc@univ-grenoble-alpes.fr
 - INP: Aurelie.Ducarre@grenoble-inp.fr

English

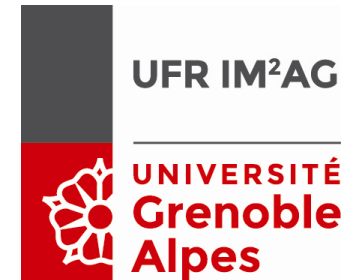
- Compulsory for 3rd-year Ensimag students
- All non-Ensimag students are supposed to have already B2 level at least in English (no course offered)

Tracks offered

- **Modeling, Scientific Computing and Image Analysis:** HPC, optimization, inverse problems, medical imaging, deterministic and stochastic modeling
- **Data Science:** (data mining, machine learning, optimization, informatics, applications)
 - **fundamentals** – ML theory, statistics, stochastic modeling and processes...
 - **large-scale** – Distributed computation, data bases and optim. Common with the master of informatics (MoSIG). Same courses, timetables, exams, ...
Different websites, Massih-Reza Amini head of DS in MoSIG, maybe different dates for thesis defense, pure research prog., ...



Mixing tracks



- **2x3 ECTS may be chosen in:**
 - **Other tracks (than your main track in MSIAM)**
 - **Other master programs.**
- **In replacement of 2x3 ECTS of your track**
- **List of master programs:**

<http://formations.univ-grenoble-alpes.fr/fr/catalogue/master-XB.html>

Modeling, Scientific Computing and Image Analysis (MSCI)

- Advanced Imaging
- Convex and distributed optimization
- Efficient methods in optimization
- [GPU computing](#)
- High Performance Computing for Mathematical Models
- Inverse methods and data assimilation
- Medical Imaging: tomography and 3D reconstruction from 2D projections
- [Model exploration for approximation of complex, high-dimensional problems](#)
- Modelling Seminar and Projects
- [Numerical optimal transport and geometry](#) (with MoSIG)
- Optimal Transport, level-set: applications to image
- Software Development Tools and Methods
- Wavelets and applications

NEW in 2018

Fundamentals of Data Science

- Advanced algorithms for machine learning and data mining
 - Advanced learning models
 - Bayesian statistics
 - Computational biology
 - Efficient methods in optimization
 - Fundamentals of probabilistic data mining⁽²⁾
 - High Performance Computing for Mathematical Models
 - Inverse methods and data assimilation
 - Machine Learning Fundamentals
 - Model exploration for approximation of complex, high-dimensional problems
 - Model selection for large-scale learning⁽²⁾
 - Modelling Seminar and Projects
 - Numerical optimal transport and geometry
 - Software Development Tools and Methods
 - Stochastic Calculus and Applications to Finance⁽³⁾
 - Wavelets and applications
- (1) Practical (tool-oriented)
(2) Theory and practice
(3) Theory-oriented

NEW in 2018

- Advanced Algorithms for Machine Learning and Data Mining
- Advanced learning models
- Category Learning and Object Recognition
- Computational biology
- **Convex and distributed optimization**
- Data Challenges
- **Data management in large-scale distributed systems⁽¹⁾**
 - (1) Practical (tool-oriented)
 - (2) Theory and practice
 - (3) Theory-oriented
- Data science seminar
- **Distributed Systems**
- **Fundamentals of probabilistic data mining⁽²⁾**
- **High performance computing for mathematical models XOR GPU Computing**
- Information access and retrieval
- Information visualization
- **Machine learning fundamentals**
- **Model selection for large-scale learning⁽²⁾**
- Numerical optimal transport and geometry
- Software development tools and methods

mandatory courses

**elective advanced
ML courses**

application courses

Choosing the lectures

- Fill online and validate online form before **September 21**
- Warn us if you do not have the link
- Particular cases (**see next slide**): fill online form and send corrections by email before **September 24** to Edouard Oudet and Jean-Baptiste Durand.
- Incomplete online timetable: https://msiam.imag.fr/m2_timetables
- Pay attention to the balance between fall and winter periods!
- Courses with < 12-15 students may not open (second round of choices needed then)



Modelling seminar and projects (6 ECTS)

Aim: to go deeper into one subject, by applying to a research or industrial project. The subject generally related two one lecture or more.

A list of topics will be released soon. Possibility to ask your teachers to add some specific topic to go deeper in the proposed course.

Supervised teamwork during your free time. Choose 2 projects.

Examples of proposed projects in 2017-2018:

Analysis of daily asset returns of 250 companies over 20 years

Identification of vessels topography and tumor vascularization through image analysis

Medical Imaging, Tomography FBP and “less than short scan” methods

Motion of red blood cell membrane by diffusion of distance function

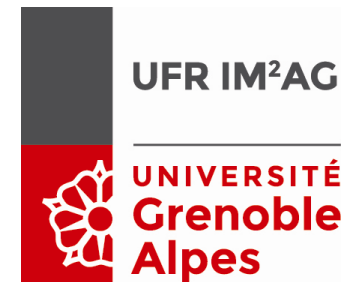
Simulation Tools for IMU sensors

see also:

<http://chamilo.grenoble-inp.fr/main/document/document.php?cidReq=ENSIMAGWMM9AM10>



Exotic courses



- Data science seminar (3 ECTS)
 - 6 seminars on Thursdays, 3:45PM. Involves reading articles and writing reports. Hot topics in data science.
- Data challenge (3 ECTS)
 - From October to February, including 3 days (full-time)
February 6-8
 - Intermediate milestones from October to December (3 Thursdays PM)
 - Prediction of the concentrations of 4 pollutants in the district with ATMO Aura

Attending the courses

- Courses start on October 1st.
- Attending the courses (and associated supervised practical work, defenses, etc.) is mandatory.
- Absence must be motivated (provide a certificate in case of a disease) and if predictable, must be notified in advance to the teacher.

- From September 21 to 28
- Do not bring ECTS
- Linux systems
- Introduction to python
- Matrix numerical analysis & numerical optimization
 - Those are mandatory for:
 - non-Ensimag students
 - Ensimag students with grades $< 12/20$ in any of these courses: 1st year probability, 1st year statistics, 2nd year optimization

- Software development tools and methods (3ECTS) is strongly recommended (C++, gdb, valgrind, python, ...) unless you know the meaning of

```
void Obj::f(const double *x, void (*f) (const unsigned int, const double *,void *,double *)) const
```

Master thesis project

- **Research or industrial project in applied mathematics**
- “Research” means “In academic laboratories or research centers in industry”
- “Industrial” means ... “in industry”!
- In France or abroad
- Key dates
 - Full-time: from February to June (after examinations!)
 - Defenses first round: June, 21-28 (possibly)
 - Defenses second round: August 25-29 approx.

Project hosting organisations

- Academic laboratories
 - In Grenoble: LJK, TIMC, LIG, GIPSA-lab, Inria,...
- Research centers
 - In Grenoble: Orange labs, CEA, ST Microelectronics, Schneider Electric, Xerox Research Center, Hewlett-Packard, ...
- In France or abroad
- Rule: students undertaking a project in industry or outside a local academic laboratory must find a local tutor

Examples of 2018 internships

- Autonomous vehicle navigation among people (Inria, Grenoble)
- Learning to grasp with visual guidance (Inria, Grenoble)
- Multi-class semi-supervised learning through pseudo-labelling (LIG, Grenoble)
- Uplift prediction in auctions for on-line advertisement (Criteo, Grenoble)
- Continuous learning for document categorization (Tessilab, Grenoble)
- Artificial neural network potential for molecular dynamics simulations (The Hong Kong Polytechnic University)
- Développement d'une méthode de suivi Lagrangien de particules dans un code CFD
- Acceleration methods for convergence of convex optimization algorithms (University of Washington, USA)
- Hybrid numerical methods for multiphase flows (LJK, Grenoble)
- Introduction to quantum computing (Cerfacs, Toulouse)
- Lagrangian particle tracking in CFD codes (Cerfacs, Toulouse)

Graduation rules

Award of Master degree

- Range of marks: 0 to 20
- Mark **of 7 or above** for each unit
- Weighted average mark of 10 or above for both semesters
- In case of failure, a second session is proposed

Grading rules may vary (exam, lab work,...). Check the rules with your lecturer...

Grading system

[16, 20]	Excellent
[14,16[Very good
[12,14[Good
[10,12[Passable
[0,10[Fail

Plagiarism

- You have to respect the laws of intellectual property-such as copyright
- No one is allowed to appropriate the labor of the original author
- During exams, you must obey the rules

=> University disciplinary commission

Plagiarism

- <http://en.wikipedia.org/wiki/Plagiarism> (especially sections 2, 3.1, 3.3)
- <http://advice.writing.utoronto.ca/using-sources/how-not-to-plagiarize/>
- <http://advice.writing.utoronto.ca/using-sources/paraphrase>
- <http://advice.writing.utoronto.ca/using-sources/quotations>
- Gipp, Bela (2014). Citation-based Plagiarism Detection: Detecting Disguised and Cross-language Plagiarism using Citation Pattern Analysis. Springer Vieweg. ISBN 978-3-658-06393-1. p.10
- In short:
 - Use citations when presenting definitions, theorems, models, results obtained by someone else.
 - Use citations and quoting marks when copying some expression, sentence or paragraph.
 - If you do not cite anyone, this is either personal original work or plagiarism.

Student representatives

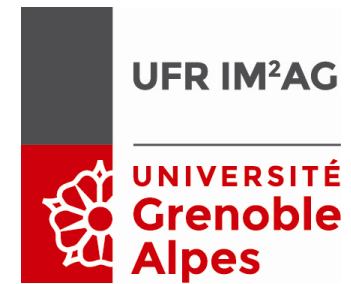
- Meeting on October 26 12:45PM to collect feedback on semester organization
- Taking part to the development council (MSIAM M2)
 - Aims at improving students training, connections with industry, ...
- One student representative and one deputy needed (maybe 1 newcomer + 1 Ensimag or M1 MSIAM student?)
- To apply please contact the heads. Vote if multiple applications?

Future meetings

- Plenary:
 - Presentation of semester 2 (internship projects and rules)
 - PhD fellowships, the French system (takes about a day ;-) !)
- Representatives:
 - Pedagogical committee
 - Orientation council



ECMI



- European Consortium for Mathematics in Industry
- <https://ecmiindmath.org/>
- Modeling weeks
 - Training in mathematical modelling
 - International
 - 2018: Serbia. 2019: Germany (Spring) and Spain (Summer)
 - Teamwork
 - Support for 2 MSIAM students

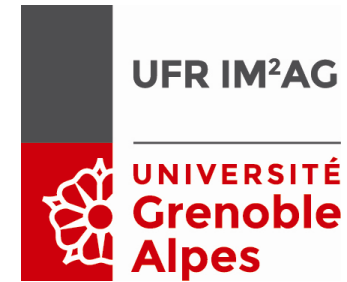


Meetings: jobs in applied maths

- Forum for Maths in Industry
 - December 13 in Paris
 - Attend conferences, meet companies, receive job offers
 - Possible support from the French Society for Maths in Industry (SMAI): 2 students last year
 - <http://www.forum-emploi-maths.org/>
- PhD Day
 - November 15 in Grenoble (PM only)
 - Be informed about PhD theses.
 - Plenary conference (in French), presentation of doctoral schools (in English), meeting with PhD students



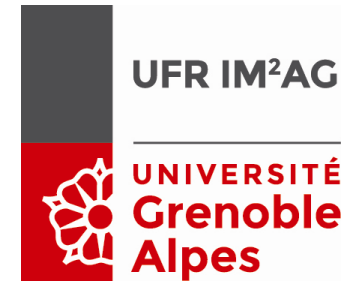
Our webpage



- MSIAM website: <http://msiam.imag.fr>
- News
- Timetables
- Job offers (PhD Positions)
- Internship positions
- PhD grants
- FAQ
 - Grades, examinations, diploma
 - Do I write to Carine, Sylvia, Edouard, Jean-Baptiste or to all of them?
 - Official rules and documents

Summary

- MSIAM website: <http://msiam.imag.fr>
- msiam2@imag.fr
- Timetable: <https://edt.grenoble-inp.fr/2018-2019/exterieur>
- MSIAM billboard in Ensimag's lobby
- Sylvia's office: Ensimag Registrar's office D101bis
- Carine's office: UFR IM²AG Registrar's office "scolarité"
- Use your Grenoble university email address as soon as you have one



Thank you for your attention

Questions?

msiam.imag.fr