UNIVERSITY OF LILLE

European benchmark university, recognized for the excellence of its lifelong training, the University of Lille is setting up at the beginning of the 2020 academic year a renewed training offer in its diplomas, programs and teaching methods which places the student at the heart of his/her concerns, to encourage his/her involvement and success. It offers 195 training mentions in line with there changes in the socio-economic world, backed by cutting-edge international research conducted by 62 research units in order to raise the major challenges of there society.

FACULTY OF SCIENCE AND TECHNOLOGY

The faculty of science and technology is a training and research unit of the University of Lille.

It brings 9 training departments and 27 research structures in the following areas :

- Biology ; Chemistry ; Electronics, Electrics engineering, Automatic ; Computer Science ; Mathematics ; Mechanics ; Physics ; Earth Science ; Station Marine Wimereux.

The faculty of science and technology of the University of Lille offers a multidisciplinary training offer quality, from Bachelor to PhD, through professional bachelors and master's degrees. The faculty hosts every year on the campus more than 7 000 students in initial training.

ADMINISTRATIVE STAFF

Faculty of Sciences and technology Mathematics Department

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- Pedagogical Secretariat :
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APPLICATIONS

Prerequisites for access to Master 1: Bachelor–level knowledge in mathematics.

The recommended mentions of Bachelor are those of mathematics, mathematics-computer science or any other scientific bachelor with a strong mathematics level.

Prerequisites for access to Master 2: a first year of master's degree (Computer Science, Mathematics, Mechanics, Physics, ...) is required to apply. A validation of studies or professional experience is necessary for students wishing to apply but not having the required qualifications.

Admission capacities: 20 places in Master 1, 18 places in Master 2.

International students must complete the Campus France procedure as soon as possible (campusfrance.org/en) for application to the Master and Student Visa.

Students with no Campus France agency in their countries and Europeans have to go through the university's application program e-candidat

https://ecandidat.univ-lille.fr/

RECRUITMENT **CALENDAR**

- Opening: May 4, 2020 - June 12, 2020
- Publication of admissions: beginning of July 2020.
- Campus France: before 06/03/2020
- e-candidat: from 02/03 to 24/04/2020

INTERNATIONAL RELATIONSHIPS

- The University of Lille has a policy of supporting international access to its courses. That's why it has introduced special procedures to make international students feel welcome and form collaborations.

  https://www.univ-lille.fr/home/international-student/

- Practical information for your stay at the University of Lille

  https://www.univ-lille.fr/home/international-student-tool-box/

Master

Master 1 / Master 2

Mention

Mathematics and applications

SCIENTIFIC COMPUTING

NEW PROGRAM
Accessible in: initial training, continuing education

Université de Lille

FACULTÉ DES SCIENCES ET TECHNOLOGIES
Département Mathématiques

OBJECTIVES

This Master offers a high-level training in high performance computing for numerical simulation.

Students who have validated this degree have:

- for 2/3, found a job as an engineer or research engineer in a company or an applied research center;
- for 1/3, improved and completed their skills in scientific computing, preparing a PhD thesis.

The objective of the Master degree is to train scientists able to understand the models from physics and industry, to create and implement simulation methods for these models in an optimal way on the most recent parallel computer architectures.

The training provides:

- know-how in mathematical modeling of physical phenomena;
- a mastery of universal mathematical and computer tools (optimization, signal processing, programming);
- an expertise in simulation of the physic's equations physics (partial differential equations): efficient numerical schemes and methods;
- expertise in programming languages and supercomputing: parallel computing, accelerator (GPU) programming, distributed computing.

STRENGTHS OF THE TRAINING

- The major assets of this training are its multi-disciplinary nature and its coherence. The students succeed in mastering the whole process of numerical simulation: from an abstract model to an in silico simulation that makes the best use of available computing resources. This makes them valuable and rare recruits both in the private market and in research laboratories.
- There is a strong interaction between fundamental courses and practical modules, extended by numerous supervised projects concretely implementing the acquired knowledge.
- For their specialization, the master 2 students have powerful computing resources to carry out their projects (the hybrid cluster from the DSI computing center of University of Lille as well as access to the Grid'5000 nation-wide computational grid).
- The teaching team is composed of (associate) Professors from 5 joint research units of the Faculty of Science and Technology as well as invited speakers from the economic world.
- Master scholarships of up to 10,000€ are awarded to the most deserving students. The deadline for applying for scholarships is March 1st, 2020

TARGETED SKILLS

The skills acquired by students are:

- a general multidisciplinary scientific culture in modeling (physics, mechanics), applied mathematics (partial differential equations, linear algebra, optimization, probabilities), in computer science (languages and programming principles), in scientific english.
- finer practical knowledge in applied mathematics on the handling of partial differential equations (PDEs), and methods to solve these PDEs using computers.
- the masters of programming languages adapted to scientific computing (C++, Python) and the practice of high performance computing on the most recent hardware architectures.
- the ability to apply these skills in a professional situation through a 4-to-6-months internship in a company or a research laboratory/center.

JOB OPPORTUNITIES & FURTHER STUDIES

JOB

The professional circles targeted at the end of the training are those of modeling and numerical computing, in particular large-scale national companies, SMEs, specialized technical centers and scientific organizations carrying out research and development activities in the disciplines requiring Mastery of numerical simulation tools. The most frequently held positions are those of research and development engineer, design engineer, project manager, software engineer, consultant, HPC expert, or research and development project manager. About 2/3 of the students of the Master's degree enter the professional sphere.

STUDIES

About 1/3 of the Master's students continue with a PhD thesis. It is possible under certain conditions (access through application). The 3-year doctorate is carried out in a research laboratory in France or abroad. Cifre (industrial) theses are also possible. Here are some examples of French laboratories that have welcomed Master students: Inria Lille North Europe, LJAD - University Côte d'Azur, LIAS - University of Poitiers, LIRIS - ENS Lyon, CRIStAL - University of Lille / University of Mons, L2EP - University of Lille / Valeo Electrical System, PhD CIFRE University of Lille / HYGEOS

TRAINING ORGANIZATION

The training is part of the Graduate Program «Science and technology for an information and knowledge society», a multidisciplinary program of the challenge «Human-friendly digital World».

Nvidia, Intel, Atos-Bull, IBM or other national companies regularly intervene in training through a seminar or a training day.

Master 1 courses are taught in French, Master 2 courses are taught in English. The recommended level of English corresponds to level B2 of the Common European Framework of Reference.

The training is organized around Knowledge and Skills Blocks (BCC)

Taught in French
MASTER 1 - Semester 1

BCC THEORETICAL BASIS 1 (18 ECTS)
- Convex optimization
- Modeling and approximation by finite differences
- Probabilities - models and applications

BCC PRACTICAL TOOLS 1 (12 ECTS)
- Numerical analysis with C++
- Factor analysis
- Student project

MASTER 1 - Semester 2

BCC THEORETICAL BASICS 2 (15 ECTS)
- Study of elliptic and parabolic problems
- Numerical tools for scientific computing

BCC PRACTICAL TOOLS 2 (15 ECTS)
- English
- Openness to physics
- Supervised research work
- Student project

Taught in English
MASTER 2 - Semester 3

BCC BASIC TOOLS AND SOFT SKILLS (12 ECTS)
- Prerequisites
- Seminars

BCC HIGH PROFILE SKILLS (18 ECTS)
- Mathematical tools for simulation
- Supercomputing

MASTER 2 - Semester 4

BCC SCIENTIFIC COMPUTING APPLICATIONS (12 ECTS)
- 2 choices from the following list of courses proposed every year:
  - Scientific computing for optimization and machine learning
  - Scientific computing for electrical engineering
  - Scientific computing for mechanics
  - Scientific computing for parallel numerical linear algebra
  - Scientific computing for material science
  - Scientific computing for nonlinear optics and photonics

BCC INTERNSHIP IN A COMPANY OR RESEARCH LABORATORY (4 TO 6 MONTHS) (18 ECTS)

FRANCE compétences
enregistrée au RNCP

For more information on the national diplomas offered by the Faculty of science and technology of the University of Lille, consult the training catalog:
www.univ-lille.fr/formations.html