

The MIHPS MSc. is joint degree of Université de Versailles Saint-Quentin-en-Yvelines, Ecole Centrale de Paris, Ecole Normale Supérieure de Cachan and UniverSud PRES.

## Partners

*The training is part of a close partnership with CEA DAM and the Consortium Ter@tec (<http://www.teratec.eu>)*

*CEA is a French government-funded technological research organization (French Atomic Energy Commission).*

*Ter@tec is an association which brings together more than sixty companies and research laboratories and was brought into being on the initiative of the CEA in order to constitute a European pole of competence in high performance digital simulation. It was entrusted with the objectives of federating the whole range of industrial and academic players, systems suppliers and users, providing access to the most powerful systems currently available, promoting and increasing the attractiveness and the appeal of this sector by fostering economic development.*

### Members of Ter@tec:

Airbus, Aria Technologies, Bertin technologie, Bull, CEA, Cenero, Centre scientifique et technique du bâtiment, Cerfacs, ClusterVision, CNRS, Communication et Systèmes, Dassault aviation, DataDirect Networks, Distène, Ecole centrale Paris, Ecole des Mines de Paris, Ecole normale supérieure de Cachan, EDF, ESI Group, Eurobios, Ansys-Fluent, Fujitsu, HP France, IFP, INRIA, Institut national des télécom, Intel, Numtech, Open Cascade, Oxalya, Principia, Safran, Serviware, SGI, ST Microelectronics, Sun, Supelec, Total, Transtec, UVSQ.

## Research laboratories

*The MIHPS MSc. is supported by*

*Ex@tec lab.: public private partnerships Intel, CEA  
GENCI, Université de Versailles St-Quentin-en-Yvelines*

*PRiSM Lab. (UMR CNRS) and LRC ITACA (CEA),  
Université de Versailles St-Quentin-en-Yvelines*

*CMLA Lab. (UMR CNRS), ENS Cachan.*

*MAS Lab., Ecole Centrale de Paris.*

*These collaborations will enable students access to the latest generations of hardware and software.*



All major industrial and research sectors use high performance computing and simulation tools. High performance computing is also becoming an important issue for company competitiveness allowing them to reduce time and cost of their product design.

This master is the first Master of Science in France dedicated to train managers specialized in this vital area. By using the tools and techniques for high performance computing and simulation, students will assimilate the recent major scientific developments determined by the increasing importance of simulation tools and the continuous augmentation of the power of computing systems.

**MIHPS web page:**  
**<http://mihps.prism.uvsq.fr>**

### Contact :

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**Application for candidacy for the Master's Degree**

see  
<http://mihps.prism.uvsq.fr>



**Master of Science in  
Informatics,  
High Performance Computing  
and Simulation**



<http://mihps.prism.uvsq.fr>



## Presentation

MIHPS is a Master of Science devoted to the training of top scientists able to acquire two major technological developments:

- the systematic use of parallelism (from multicore computers to supercomputers)
- the use of numerical simulation industry and research

A major feature of this master is to give future graduates a multidisciplinary skill, an expertise of high performance computing and parallel computing and an expertise of modelling / simulation techniques.

## Master organization

The MIHPS is a full-time four semesters Master degree.

To apply to the MIHPS MSc., you need to be

1. graduate at the level L in the European LMD system in computer science, engineering, mathematics or physics
2. graduate with any equivalent degree as bachelor.

The first two semesters of the Master provide skills and knowledge necessary for advanced study in computer science, high performance computing and simulation.

Two specializations are offered in second year of the master, each one has two orientations: vocational or research.

- M2 High Performance Computing
- M2 High Performance Simulation



## Program content

### Master 1

Semester 1 (30 Credits, 294h)

#### Initial preparation courses

##### Computing skills background

- Imperative programming
- Computer architecture/Operating systems

OR

##### Mathematics skills background

- Mathematics basics
- Scientific modelling techniques

#### Core courses

- Parallel architectures
- Numerical algorithms
- Object-oriented programming for scientific computing
- Numerical programming project
- English (for non-native) and French (for non-native)

Semester 2 (30 Credits, 276h)

#### Core courses

- Technical writing and speaking (English or French)
- Distributed algorithms
- Parallel programming
- Operations research
- Scientific visualization
- Code optimization for parallel programs
- Parallel programming project

Opening in september 2010

### Master 2 MIHP

#### *Specialization: High Performance Computing*

The training objective is to develop advanced skills in the field of architecture and high performance parallel computers and software. (**Opening in 2011**)

Semester 3 (30 Credits)

#### Core courses

- Advanced compilation
- High performance microprocessor architecture and code optimization
- Software engineering for scientific computing
- Performance evaluation
- FPGA, GPU, architecture and programming
- Project
- Technical writing and speaking (English or French)

#### Elective courses

Modelling methods in Biology, Modelling methods in Finance, Modelling methods in Fluid Mechanics, Embedded systems architecture, High performance algorithms for signal processing.

Semester 4 (30 Credits)

#### Internship

### Master 2 MHPS

#### *Specialization: High Performance Simulation*

The training objective is to cover the field of high performance simulation through the study of large classes of numerical methods and their applications on some major areas. (**Opening in 2011**)

Semester 3 (30 Credits)

#### Core courses

- Modelling and simulation
- Finite element, finite volume, finite difference methods
- Spectral methods
- Continuous optimization
- Project
- Technical writing and speaking (English or French)

#### Elective courses

Statistics and data mining, Stochastic processes, Modelling methods in Biology, Modelling methods in Fluid Mechanics, Materials simulation.

Semester 4 (30 Credits)

#### Internship