



Turbulence

An International Master's Programme in France

(Entirely taught in English)

imp-turbulence@ec-lille.fr

<http://imp-turbulence.ec-lille.fr/>

The **International Master's Programme in Turbulence** is jointly offered in english by Ecole Centrale de Lille (<http://www.ec-lille.fr>), Ecole Nationale Supérieure de Mécanique et d'Aérotechnique de Poitiers (<http://www.ensma.fr>) and Ecole Nationale Supérieure d'Ingénieurs de Poitiers (<http://www.esip.univ-poitiers.fr>).

It consists of three semesters of courses followed by a thesis project. Upon completion of the programme students are awarded the Master of Science (MSc) degree. Two semesters will take place in Lille at Ecole Centrale. One semester will take place in Poitiers, shared by ENSI Poitiers and ENSMA. This will allow the students to experience two scientific and cultural environments. The last semester is devoted to the Master thesis (in english) which can be carried out within or outside of France at a variety of collaborating industry and university environments.

The programme deals in depth with modern **computational** and **experimental** approaches to **turbulent flows**. The International Master's Programme in Turbulence is taught entirely in **English**. Courses on French language and culture are also given to the foreign students in order to help them benefit fully from their stay in France.

The program is tightly linked to ongoing research on turbulence and related topics in the two research laboratories associated to it:

Laboratoire de Mécanique de Lille <http://lml.univ-lille1.fr>

Fédération de recherche PPRIME <http://primme.labo.univ-poitiers.fr>

Programme Outline

The complete programme covers **four semesters of studies**, starting in the fall. One semester of fulltime studies equals 20 credit units (ECTS). The programme includes 94 ECTS of courses and a Master's thesis of 26 ECTS. The Master's Programme will begin in October of year 1 and end in June or September of year 2 (depending of the extend of the master thesis stage). The overall goal of the formal courses is to prepare the student to step into almost any industrial or research environment with sufficient knowledge (computational and experimental) to be able to contribute almost immediately.

Courses:

Students are **required to complete compulsory recommended and elective courses** in each semester. Compulsory courses are *Turbulence theory*, *Experimental Turbulence*, *Turbulence modeling*. Almost all of them include laboratories, either computer or experiment. A special practice is done on industrial fluid mechanics codes. Electives can be chosen from a great variety of offerings in areas such as combustion, multiphase flow, turbomachinery, acoustics, heat transfer...

Semester 1	Semester 2	Semester 2
Compulsory		
Turbulence Theory	Experimental turbulence	Turbulence Modelling
CFD Labs	Experimental Labs	Compressible turbulence
		Signal Processing labs
		Experimental Labs
Recommended		
Fluid Mechanics	Advanced Mathematics	Advanced signal processing
Computational Fluid Mechanics	French culture	French culture
Language Course		
Electives (3/ semester)		
	Wall turbulence	Aero-acoustics
	LES modelling	Stability & chaos
	Turbulence & Turbomachinery	Optimization & control
	Direct Numerical Simulation	Turbulent heat transfer
	Two phase flow	Turbulent combustion & mixing
Semester 4		
Master Thesis		

"I all respects, I believe this to be an outstanding program which I support with enthusiasm."

Alexander J. Smits, Princeton University

Programme directors :

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