

ENGINEERING MAJOR MECHATRONIC SYSTEMS FOR REHABILITATION



MECHATRONIC SYSTEMS FOR REHABILITATION

Pierre and Marie Curie University proposes, in partnership with Brescia University (Italy), an international master for the design of mechatronic systems which cooperate with human beings.

This unique specialty in France in engineering dedicated to the human being is distributed on two years (4 semesters)

The first year provides all the mechatronic basics to train engineers capable of handling all kinds of computer-controlled or microprocessor-controlled modern systems. During the second year, the knowledge is completed by human-machine interaction aspects and understanding of human behavior, useful to the development of mechatronic systems for rehabilitation (diagnosis assistance, functional rehabilitation and motivity assistance).

- Design of mechanical parts taking into account reliability constraints and operational safety
- Integration and control of actuators
- Instrumentation of the platform for the compilation of human-sent signals
- Development of information-processing algorithms (signal or image) for therapeutic purposes

The competences acquired during this program for systems in medical environment, are also useful in many other modern life systems, as for example sports equipment, means of transportation, interactive games, robots, etc.

Part of the courses is taught in English, at UPMC and Brescia university. But this training is also a good opportunity for students to learn Italian during the first year.

VALIDATION OF THE DIPLOMA - DOUBLE DIPLOMA

The time spent studying at Brescia university is recognized by UPMC. The marks awarded in Italy allow the validation of the second semester, if necessary through compensation, and to validate the delivery of the master diploma in engineering science. The courses taken during the period of mobility clearly appear in the diploma supplement.

Brescia university also delivers the diploma "Laurea magistrale in ingengneria dell'automatizione industrial", Master in industrial automatisation.

FIRST YEAR M1

$\rightarrow \mathbf{1^{st}\ semester}$

During the first semester students attend at UPMC a selection of teaching units in various domains of mechanics and electronics of the engineering science master. Invited Italian professors are responsible for some of those units, thus preparing students to their mobility in Italy.

\rightarrow 2nd semester

The second semester, takes place in Brescia university (Italy). French professors visit UPMC students in Brescia and follow up their integration in Brescia university.

SECOND YEAR M2

→ 1st semester

During the first semester of the second year (third semester of master), UPMC students and Brescia university students come back together in France to take specialized courses taught in English and acquire various skills in mechatronic systems cooperating with human beings

ightarrow 2nd semester

During the second semester of the second year (fourth semester), the students do an internship, in France or abroad, in any company or research laboratories. A certain number of partnerships with research laboratories already exist.

APPLICATION AND ENROLLMENT

• Enrollment in first year

Provided they have the necessary pre-requisites, this curriculum is open to students holding a Bachelor's degree in: mechanics, electronics, computer science, Physics, Mechatronics. It is also open to medical students who would like to complete their training. It is not necessary to be fluent in Italian at the beginning of the courses.

Enrollment in second year

Students may join the second year provided they are engineers or have completed 4 years after high-school graduation and seeking a specialty in research, of all nationalities. Courses during the third semester will be taught in English.

Applications

Candidates are invited to send or to bring to UPMC, before the deadline announced on UPMC's website (http:/ www.upmc.fr), generally end of June or beginning of July, their complete application including first semester's results of the ongoing year to the following address :

Madame Edith Douchez Master SDI Spécialité Mechatronic systems for rehabilitation

Pierre and Marie Curie University Boite 164 - Bâtiment Esclangon Second floor - 232 bis door 4 place jussieu 75 252 Paris cedex 05 - France

> ORGANISATION DU PROGRAMME INTERNATIONAL



Students from Brescia university participate in the project. They work with French students during the second semester, then they come to Paris with them to attend the third semester. Students of any other nationalities join.

> HELP WITH MOBILITY

Financial help

The students admitted in this program benefit from financial help cover the cost of their mobility to Italy during the second semester.

The cost of the fourth semester internship is covered by a grant from the hosting structure and can be often completed, depending on the destination, by bilateral agreements or the Leonardo program.

A truly international student group

During the second semester, the students from UPMC are twinned with Italian students from the international program upon their arrival in Brescia. This helps them integrate more smoothly. This Franco-Italian group comes to France for the third semester to study specialized courses and keep working together.

Assistance with organization

The two establishments have implemented an exchange agreement, which exempts students from tuition fees in the other university.

Each university's international relations department accompanies the students of the program in all practical aspects: enrollment, social service, language courses, life on campus, and integration in the city or any other question which could rise.

Help for finding accomodation

UPMC and Brescia university helps the students in the exchange program by giving them priority access to university accommodation during their mobility.

Pedagogical monitoring

The students are supervised during the entire program and even more specifically during their mobility by a pedagogical tutor at their host university.

BRESCIA

Contact et renseignement

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"I chose this training course for several reasons.

It's a very rewarding experience to contribute to the design and implementation of a robotic system capable of improving the daily life of handicapped people. I think this brings human values into research and development activities.

On top of this, this international program is a unique and beneficial experience. I would recommend it to any student having doubts or hesitating to take the plunge. It brings both cultural and social enrichment: we get to learn a new language quickly, we discover new teaching methods, and we are introduced to new ways of life and sometimes different mindsets. But these challenges shape our adaptability and openness to new situations. Lastly, recruiters value mobility and open-mindedness as strong assets."

Cyrille



AN INCREASING DEMAND

The growing importance of health and ageing of the population has opened new applicative fields in the medical or paramedical sectors, especially medical: for diagnosis and rehabilitation.

The opportunities following this curriculum are in companies which design and build mechatronic systems for medical or industrial use.

The largest hospitals are already being equipped with the first existing systems. A growing number of hospitals are following this trend. These acquired competences also attract research given the emergence of this new field of application and the current findings in many domains such as neurophysiology, surgery or physics medicine.

But mechatronic systems, which cooperate with human beings, are also very often used in many other domains such as leisure, sports, car industry, aeronautics, robotics, tool machines, etc.

> JOB OPPORTUNITIES

- Medical engineers : Innovation, maintenance, exploitation
- R&D Industry Design, completion, project management
- Users training
- Research: Clinical, applied, fundamental

AN INTERNATIONAL DIMENSION

The students' mobility is planned during two semesters which enables them not only to benefit from very high-level teaching but also gain linguistic and cultural openness, thus increasing their adaptability.

This mobility experience will provide significant added-value when applying for leading foreign labs, and their recruitment in the emerging companies in this domain, often branches of foreign companies.



www.master.sdi.upmc.fr



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