Bio-Inspired Materials
Connecting the lab to the living world

SEPTEMBER 2020

A TWO-YEAR MASTER COURSE OPEN to bachelor students with majors in biology, chemistry or physics

EDUCATIONAL MANAGERS:
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MASTER BIM

Bio-Inspired Materials
An educational background to enable a connection between the laboratory and the living world

Research and development of innovative materials drawn from Nature
Objective: train future scientists in materials science and engineering, to explore innovative approaches to develop materials inspired by living systems with special regards to their composition, function, structure, architectures and processing, and in line with environmental sustainability.

In both the first and the second years of the master, the students will be trained to draw inspiration from nature through a biomimetic approach. This multidisciplinary approach, which resorts to both fundamental science and materials engineering is based on the observation and comprehension of living organisms within their ecosystems. A strong effort of abstraction to establish biological models to be adapted to scientific concepts and technological developments will be key to the course.

Adopt the biomimetism philosophy

During one or two years, BIM MSc students will have the chance to:
- obtain basic and requisite knowledge in physics, chemistry and biology
- develop curiosity about and respect for living systems
- develop a consciousness of the environment
- develop collaborative and opened working skills
- integrate principles of the living world in their scientific approach
- adopt a biomimetic approach from the concept to the materials development

Face technology, economics and environmental challenges

Is it possible to draw from Nature to process glass at ambient temperature and pressure? To get inspired by a tree leave to capture and store sunlight energy? To draw from Nature to replace micro- and nano- plastics? To generate color without dyes? To dive in the ocean to discover novel UV filters or flame retardants?

To adopt a biomimetic approach is crucial for the future of several fields of activity, from agriculture to chemistry, through the housing, cosmetics, wood-paper and automotive industries. All these currently face the challenges of sustainable development, energy saving and circular economy.

The stakes are high; we need to change our societies so that they are compatible with their environment.
Laurent BILLON

Professor in Polymer Science at the Université de Pau et des Pays de l'Adour, Laurent is vice director of the Institute of Analytical Sciences and Physical chemistry for Environment and Materials (IPREM). He is the coordinator of the European research project eSCALED on artificial photosynthesis and leads the group on bioinspired materials ‘Functionality & Self-Assembly’.

"The BIM Master, that stands for Bio-Inspired Materials, is in line with the current challenge of the ecological and sustainable transition. Mimic strategies evolved by Nature represents infinite scientific and technological challenges that will be undertaken by choosing bioinspiration and biomimetism.

With this master, unique in France, we aim at proposing to the students to explore living systems to get inspiration to develop novel materials and to keep in mind ethics and consciousness of their environment. Multi- and trans-disciplinary training, at the heart of the biomimetic approach, will enable the students to adopt new ways of thinking syntheses, formulations and processing of tomorrow materials needed by the industrial partners to build our future society.”.

Corinne NARDIN

Corinne is physics professor, with a specialization in the physical chemistry of polymers, at the Université de Pau et des Pays de l’Adour. She is a scientific officer of the excellence initiative– Science - Innovation - Territoires – Economie (I-Site) « Energy and Environment Solutions – E2S ».

"The training during the BIM Master will be focused on active pedagogy, in the project mode, which will be possible owing to a unique location of the teaching and research activities. Lectures will be at first organized to harmonize the basic knowledge of students of various educations (biology, physics and chemistry). 50 % of the lectures delivered to the 15 students are specific to the BIM master.

Through this approach, we further expect to develop the student’s soft skills in particular: encourage autonomy, stimulate curiosity, creativity and emotional intelligence. The principal objective is to train future young researchers granted with a peculiar ability to think in a collaborative mode and to drive bio-inspired research projects.”.

Educational Managers
**Master Bio-inspired Materials**

**Mention**  Materials Science and Engineering  
**Parcours**  Bioinspired Materials

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**PUBLIC**

Students in chemistry, biology, physics, earth science  
Bachelor or Master 1 diploma

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**LANGUAGE**

English

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**START**

Opening of the first and second year  
of the master in September 2020

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**LECTURERS**

Professors, researchers, and external contributions  
from private partners of the socioeconomic areas  
and from biomimetism pioneers

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**LOCATION**

Anglet Basque Country (64, France)  
Some lectures will take place in remote mode from Pau  
(64, France)

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**INTERNSHIPS**

Master 1 : minimum of 2 to 4 months of immersion in an  
academic or private research lab, in France or abroad  

Master 2 : applied research project of at least 6 months  
duration in an academic or private research lab

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**PROJECT in immersion**

Master 1 : one day a week dedicated to a fundamental  
or applied research project in collaboration with  
the academy, the industry or the European Center  
of Excellence in Biomimetism (Centre Européen  
d’Excellence en Biomimétisme de Senlis, Ceebios)  

Master 2 : two days per week devoted  
to a research project

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**EDUCATIONAL MANAGERS**

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