

Master in biomedical materials and health systems engineering

Program objectives

Train managers able to assume responsibilities in the biomaterial and biomedical sectors.

Give students a ground scientific training spanning from cellular biology and human physiology to the chemical and physical properties of materials intended for "life" uses, so that they can master the concept of biomaterial: the program includes material sciences (chemistry, materials properties and structure, material behavior and lifespan, characterization, engineering) and life sciences with a focus on host response (physiology, biology, biochemistry, biocompatibility and infections). Courses targeting specifically dental biomaterials are also offered (new TU – Teaching Unit- in dental CADM, unique in France, international track).

Skills acquired through the degree's core curriculum:

- Design an implant for a specific use
- Lead an implant biomaterial through the approval process (ISO standards, CE marking)

Specific skills acquired through the offered elective curriculum:

- Master the technologies intended for biomolecules and biomaterial analysis (TA2B track, for Techniques d'Analyse des Biomolécules et Biomatériaux: Biomolecules and Biomaterials Analysis Techniques)
- Be able to formulate new biomaterials intended for tissue engineering and for nanotechnologies (CD2B track, for Chimie et Développement des Biomatériaux et des Bio-nanomatériaux: Biomaterials and Bio-nanomaterials chemistry and development)
- Understand the dental material: its design and manufacturing (CADM), its clinical behavior, its assessment (in vitro, in vivo), and its marketing (iBiomatDent track).

Program overview

Co-accreditation with Paris 5 (dental school).

The program is organized over 4 semesters, full-time.

The first two semesters consist in a joint scientific training, with a student project of the literature review type in the first semester and an internship in the second semester. In the third semester, 20% of the classes are specific to the chosen elective curriculum. The fourth semester is devoted to an internship.

Admission requirements

- M1: automatic admission for graduates of the Bachelor in Physics-Chemistry offered by the Institut Galilée UP13, or for the graduates of the Bachelor in Life Sciences offered by the UFR SMBH UP13.

For other students: admission is granted upon review of application (minimum requirements include a bachelor-level degree in a scientific field).

- M2: open to holders of an M.S. degree and/or an engineering degree, to physicians, pharmacists and dental surgeons with a strong application.

Career placement

• Jobs

Engineer in large research institutes (CNRS, INRA, INSERM)

Project manager in the production, quality, research and development departments of health materials companies.

• Fields

Manufacturing companies or R&D laboratories in the biomedical and health sector.

Manufacturing companies involved in the development of dental biomaterials through digital engineering and CADM (large number of opportunities: thriving sector).

• Further studies

PhD programs in Biomaterials or other fields.



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SEMESTER 1

TU 1

- Materials in biomedical applications (3 ECTS credits)

TU 2

- Workshop in biomaterials: Industry and Research (3 ECTS credits)

TU 3

- Biology I (4 ECTS credits)

TU 4

- General knowledge (4 ECTS credits)
(English and writing and communication techniques)

TU 5

- Materials structure and properties (7 ECTS credits)

TU 6

- Remediation Teaching Unit (Biology or Materials) (3 ECTS credits)

STUDENT PROJECT

- Literature review (6 ECTS credits)

SEMESTER 2

TU 1

- Biology II (3 ECTS credits)

TU 2

- Materials behavior, lifespan and degradation (3 ECTS credits)

TU 3

- Main organism functions (3 ECTS credits)

TU 4

- Characterization methods (3 ECTS credits)

TU 5

- Material engineering (4 ECTS credits)

TU 6

- Host response I (4 ECTS credits)

TU 7

- General knowledge (4 ECTS credits)
(English and writing and communication techniques)

TU 8 – CHOOSE BETWEEN:

- CADM (Computer-Assisted Design and Manufacturing) (6 ECTS credits)
- Student project (continued) or 6 to 8 weeks internship (6 ECTS credits)

SEMESTER 3

Core curriculum

TU 1

- Biocompatibility and host response II (6 ECTS credits)

TU 2

- Risk prevention (4 ECTS credits)

TU 3

- Biomedical research prerequisites (4 ECTS credits)

TU 4

- General knowledge (4 ECTS credits)
(English and writing and communication techniques)

TU 5

- Workshop in biomaterials: Industry and Research (6 ECTS credits)

Mandatory elective curriculum, choose between (6 ECTS credits)

TU 6

- Host response I (4 ECTS credits)

TU 7

- General knowledge (4 ECTS credits)
(English and writing and communication techniques)

TA2B track: Techniques d'Analyse des Biomolécules et Biomatériaux (Biomolecules and Biomaterials Analysis Techniques)

TU 6

- Proteomics and metabolomics (3 ECTS credits)

TU 7

- Physical analysis techniques (3 ECTS credits)

CD2B track Chimie et Développement des Biomatériaux et des Bio-nanomatériaux (Biomaterials and Bio-nanomaterials chemistry and development)

TU 6

- Nanomaterials and bio-macromolecules synthesis and functionalization
(3 ECTS credits)

TU 7

- New biomaterials applications (3 ECTS credits)

iBiomatDent track: Parcours International de Biomatériaux Dentaires (Dental biomaterials International track)

TU 6

- Dental biomaterials and assessment methods (3 ECTS credits)

TU 7

- Clinical trials and market authorizations (3 ECTS credits)

SEMESTER 4

- Stage de 5 mois minimum (30 ECTS)

(Stage en entreprise pour Master Professionnel ou en laboratoire pour Master Recherche)

NEW

TU CADM – Applied Dental CADM

Digital engineering innovations have led to the development of Computer-Assisted Design and Manufacturing to implement a large number of materials in the industrial sector.
Cross-disciplinary approach at the cornerstone of “digital mechanical engineering” and restoration dentistry – unique in France.

For more information

- > Master's program directors: Véronique MIGONNEY (veronique.migonney@univ-paris13.fr) and Jean-Pierre ATTAL (jean-pierre.attal@parisdescartes.fr)
- > M1 directors: Géraldine ROHMAN (geraldine.rohman@univ-paris13.fr)/ Elisabeth DURSUN (elisabeth.dursun@parisdescartes.fr)
- > M2 directors: Véronique MIGONNEY and Jean-Pierre ATTAL
- > Office: Alexia PARRES – Ph.: 33. (0)1.49.4.39.25 – email: bio-materiaux.master.galilee@univ-paris13.fr