Erasmus+

BIOPHAM

Bio & Pharmaceutical materials science
EUROPEAN MASTER

SCAN ME !

Università di Pisa

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

UNIWERSYTET ŚLĄSKI
W KATOWICACH

Université de Lille

http://master-biopham.eu

8/1/2026

Frédéric Affouard frederic.affouard@univ-lille.fr

Professor at University of Lille (France)
Physics Department – Faculty of Sciences and Technologies

Research activities on Pharmaceuticals:
Physical states (crystal/amorphous) & Transformations
Small molecules, polymers and proteins

Team leader "Therapeutical Molecular Materials"
laboratory http://umet.univ-lille.fr

Coordinator of several European INTERREG 2-Seas projects
IMODE:Innovative multi-component drugs and medical devices
http://www.project-imode.eu/
11 partners (academics, industries, hospital) in France/UK/Belgium
Multidisciplinary: Materials science, Pharmacy, Medecine

Coordinator of several research projects with Industries
(AstraZeneca, Janssen Pharmaceutica, Servier, Roquette, +SMEs)

Coordinator of the Erasmus Mundus Master BIOPHAM
Bio&Pharmaceutical Materials Science since 2020
http://master-biopham.eu

BIOPHAM → A worldwide unique training programme in materials science focusing on pharmaceuticals

BIOPHAM JOINTLY OPERATED BY 4 PARTNERS UNIVERSITIES

BIOPHAM 1 [2020-2026] : 4 cohorts recruited
86 students total from 33 different countries

- « Programme countries » (EU members and 3rd countries associated to the Programme): France, Ireland, Italy, Spain, Turkey
- « Partner countries » (all other countries): Algeria, Egypt, Jordan, Syria, Bangladesh, China, Philippines, India, Indonesia, Kazakhstan, Pakistan, Mongolia, Cameroon, Ghana, Nigeria, Uganda, Brazil, Columbia, Costa Rica, Cuba, Ecuador, Mexico, Salvador, Venezuela, Georgia, Russia

BIOPHAM has been recently renewed (July 2025)
BIOPHAM 2 [2026-2031] : 4 cohorts to be recruited ☺

IN SUPREMÆ DIGNITATIS 1343 UNIVERSITÀ DI PISA

UPC UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

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Université de Lille

What students are doing after the BIOPHAM training programme ?
Based on Alumni from Cohort 1 and 2
Statistics made in February 2025 (to be updated soon)

1st cohort [2021 – 2023]
15 students total

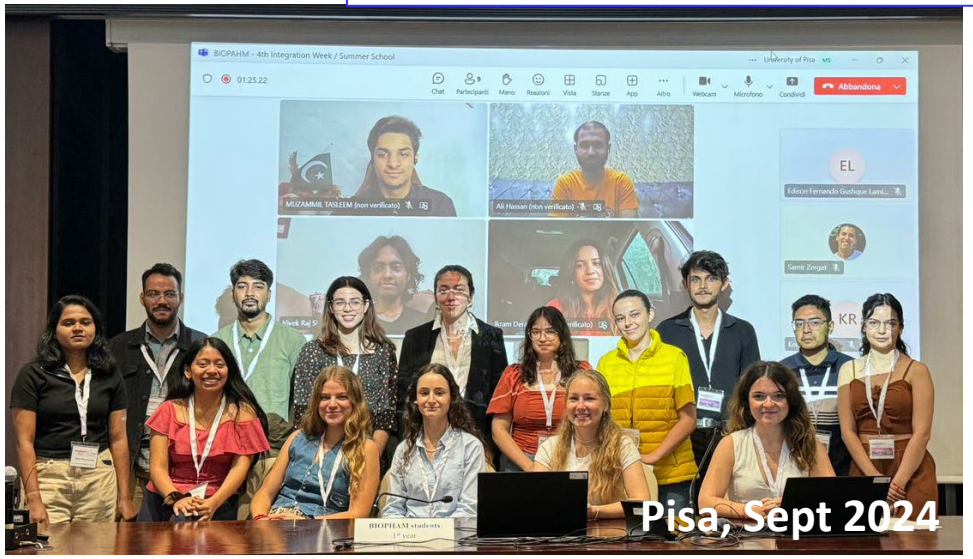
2nd cohort [2022 – 2024]
26 students total

- ~ 70% PhD
- ~ 30% Not performing a PhD
  (job in a company, Research Engineer/Research fellowship or lecturers in academia)

Pisa, Sept 2021


Pisa, Sept 2022

The BIOPHAM programme starts by an INTEGRATION WEEK



Pisa, Sept 2024


Pisa, Sept 2023

It continues with memorable moments

…

Have a look to testimonies on the BIOPHAM website ☺

https://www.master-biopham.eu/testimonies

It concludes with a very emotional graduation ceremony

GRADUATION CEREMONY COHORT 3
Barcelona, July 2025

In between the integration week, the memorable moments (parties, lunches, dinners, …) and the graduation ceremony:
→ courses, seminars, practical sessions in lab., internships, master’s thesis… and many exams!

WHAT IS BIOPHAM EXACTLY ?

BIOPHAM

Bio & Pharmaceutical materials science

EUROPEAN MASTER

This is the important word !

BIOPHAM is basically a Master in Materials Science
(physics-chemistry of materials)
focusing on pharmaceutical and biopharmaceutical materials

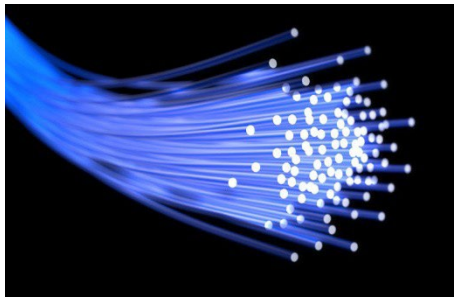
BIOPHAM IS NOT a Master in: **Bio**logy, **Bio**chemistry, **Bio**technology,
Biomedical sciences, **Pharma**cy, **Pharma**ceutical sciences,…
in which one may have some Materials science courses

Targeted students: Bachelor in Physics, Chemistry, Materials Science, Biomaterials, Nanosciences,…or related fields

Materials science: the science that is interested in materials :o)

Interdisciplinary field : Physics + Chemistry

"materials" is usually associated to metals, polymers (plastics), glass, ceramics,…

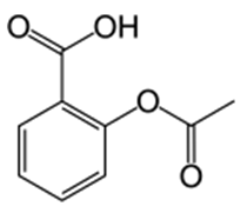


Drugs are materials (small organic molecules, polymers and bio-polymers)

One can apply « materials science » approaches to drugs

Bringing a drug to market is a long and costly process…

New Chemical Entity (NCE)



Early stage development

Pre-clinical Phase

Clinical Phase

Regulatory Approval

Marketed product

MATERIALS SCIENCE MATTERS !!!!

solubility, physical states, crystal, amorphous, polymorphism, glass, stability, metastability, unstability, structure, dynamics, mechanical properties

→ Applications on small molecules, polymers, proteins

It is better to identify "problems" at start
Than after 10 years of development and after spending 2 billions $ ☹

Pharmaceutical companies have understood it and are supporting BIOPHAM

BIOPHAM
Bio & Pharmaceutical materials science
EUROPEAN MASTER

21 large and small partners companies are BIOPHAM associated partners

Specialized seminars & lectures
Work placements – Short & Long internships

AKERN Italy

Farmigea Italy

Servier France

ALMIRALL Spain

UCB Pharma Belgium

Janssen Pharmaceutica Belgium

Xedev Belgium

Zentiva Czechia

Minakem France

Roquette France

IBI Italy

Lattice Medical France

MyBiotech Germany

Linari Engineering Italy

AstraZeneca Sweden

Spartha Medical France

BioZoon Germany

Physiolution Germany

Audio Technologies Italy

Lusochimica Italy

Cellbox Lab Latvia

A question : What is the training at the Master level of scientists working in R&D Pharma industries ?

- Associate Principal Scientist AstraZeneca
- Senior scientist AstraZeneca
- Head of Solid State Department Technologie at Servier
- Global Head Technical R&D at Novartis
- R&D scientist at Evotec
- R&D scientist at Johnson & Johnson
- Manager of the Functional Properties Analytical Laboratory R&D at Roquette
- Head of Section at Sanofi Solid State

Master in Physics, Chemistry or Material Sciences

~~Not in Pharmacy !~~

They just learn "pharmacy " on the job !

Quote from a scientist (with a background in chemistry) working in a big pharma company:

"Pharmaceutical development is far too serious to be left only in the hands of pharmacists"

BIOPHAM

Bio & Pharmaceutical materials science
EUROPEAN MASTER

It exists many Masters in Materials Science & Masters in Pharmacy

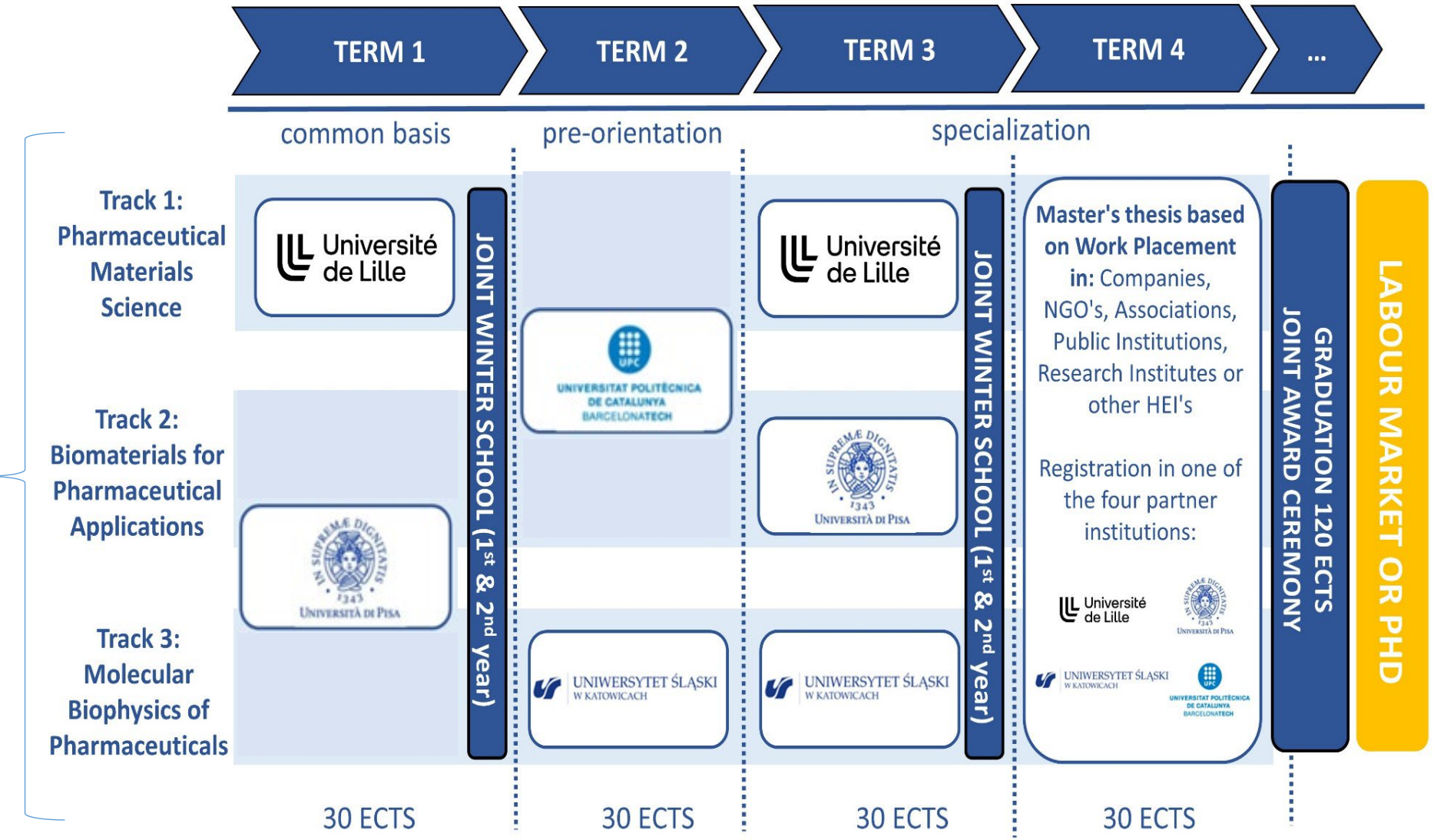
→ No Master at the interface between Materials Science and Pharmacy !

BIOPHAM → A very unique specialized training

Survey of the existing Masters worldwide:

https://eacea.ec.europa.eu/erasmus-plus/library/
https://www.findaMasters.com
https://www.Mastersportal.com
…

Mobility scheme
3 specialised Tracks



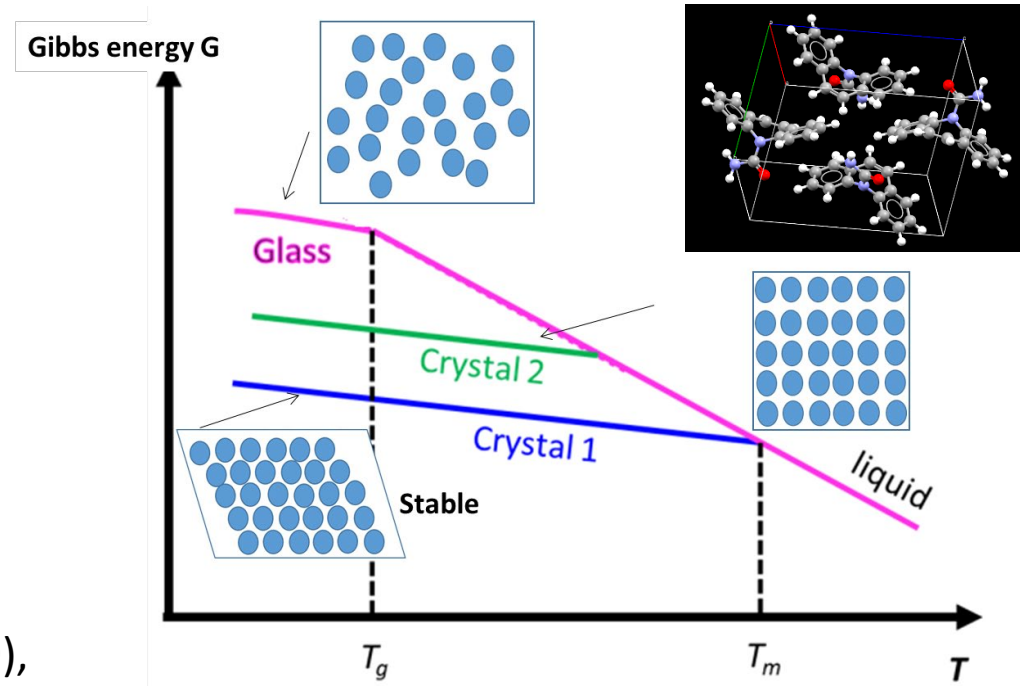
Track 1: Pharmaceutical Materials Science

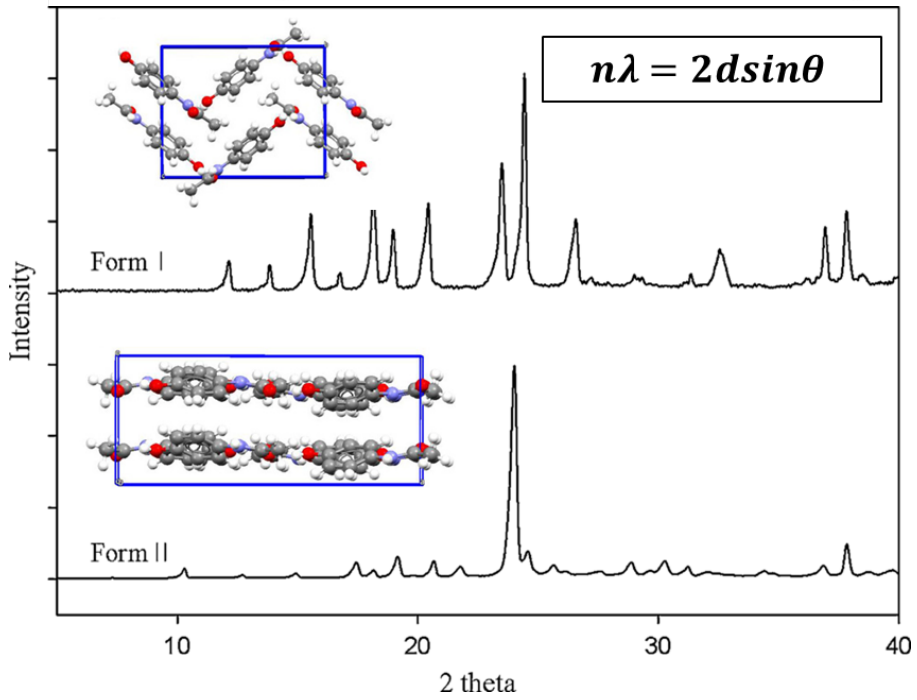
TERM 1 — Université de Lille

TERM 2 — Universitat Politècnica de Catalunya BarcelonaTech

TERM 3 — Université de Lille

- Specialized training focused on the core of "**materials science**"
- **Physical states** (crystals and amorphous states)
- **Phase transformations** (crystallization/melting, vitrification)
- **Structural, Dynamical, Thermodynamical properties**
- **Solid-state physical characterization**: powder X-ray diffraction (PXRD), thermal analyses (DSC, TGA), Raman, infrared and THz spectroscopies, optical microscopy, electron microscopies (TEM, SEM)
- **Molecular modelling** (Molecular Dynamics & Quantum calculations) and **Artificial Intelligence**





Université de Lille

Master of fundamental and applied physics
Physics Department (Faculty of Sciences & Technologies)
College of Pharmacy

Universitat Politècnica de Catalunya BarcelonaTech

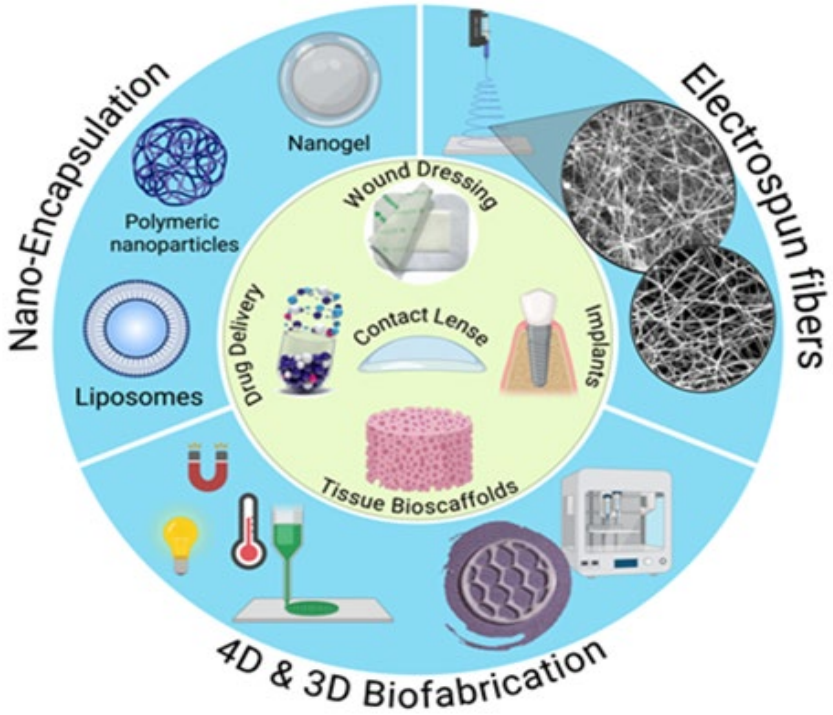
Master of Engineering Physics
Department of Physics

Track 2: Biomaterials for Pharmaceutical Applications

TERM 1 — Università di Pisa

TERM 2 — Universitat Politècnica de Catalunya BarcelonaTech

TERM 3 — Università di Pisa



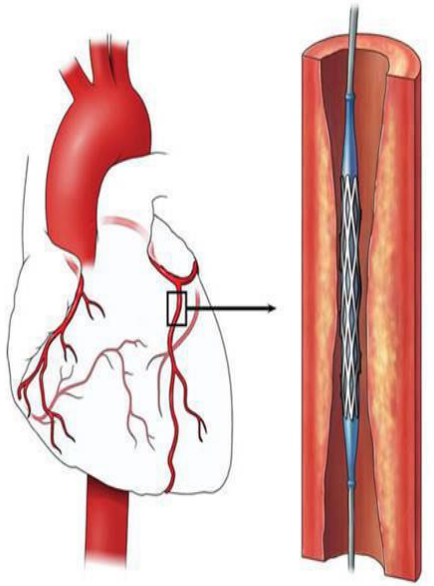
- Specialized training on the fundamental principles of **biomaterials**
- **Advanced (bio)fabrication techniques** (from macro-to-nanoscale), **modern analytical techniques, structural and imaging techniques for characterization of biomaterials** & **Modelling techniques**
- Understand the **key properties of biomaterials** and their relevance to **biomedical applications**
- Explore the **applications in drug delivery, regenerative medicine, and pharmaceutical technologies**

Università di Pisa

Universitat Politècnica de Catalunya BarcelonaTech

Master's Degree in Materials and Nanotechnology
Departments: Physics, Chemistry, Information Engineering and Civil & Industrial Engineering
Scuola Normale Superiore of Pisa

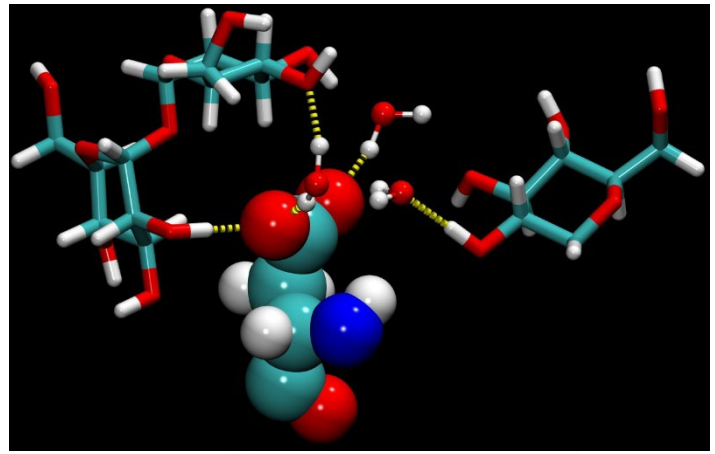
Master of Engineering Physics
Department of Physics



Stents

Track 3: Molecular Biophysics of Pharmaceuticals

TERM 1 → TERM 2 → TERM 3



- Structure, dynamics, and interactions of **biomolecules and biopharmaceuticals**.
- Expertise on **advanced techniques** such as freeze-drying, spray-drying, supercritical fluid drying, and hot melt extrusion techniques.
- **Solid understanding of processes** like freezing, thawing, interfacial stress, and interactions with specific solvents; rheological properties.
- **Knowledge of stabilization mechanisms by bioprotectants** (sugars, polymers)
- **Experimental techniques**: microcalorimetry, infrared spectroscopy, and Raman scattering.
- **Numerical techniques**: Stochastic dynamics, Machine learning and data-driven techniques

UNIWERSYTET ŚLĄSKI W KATOWICACH

Master (Field: "biophysics")
Institute of Physics, Faculty of Science and Technology

UNIVERSITÀ DI PISA

Master's Degree in Materials and Nanotechnology
Departments: Physics, Chemistry, Information Engineering and Civil & Industrial Engineering
Scuola Normale Superiore of Pisa

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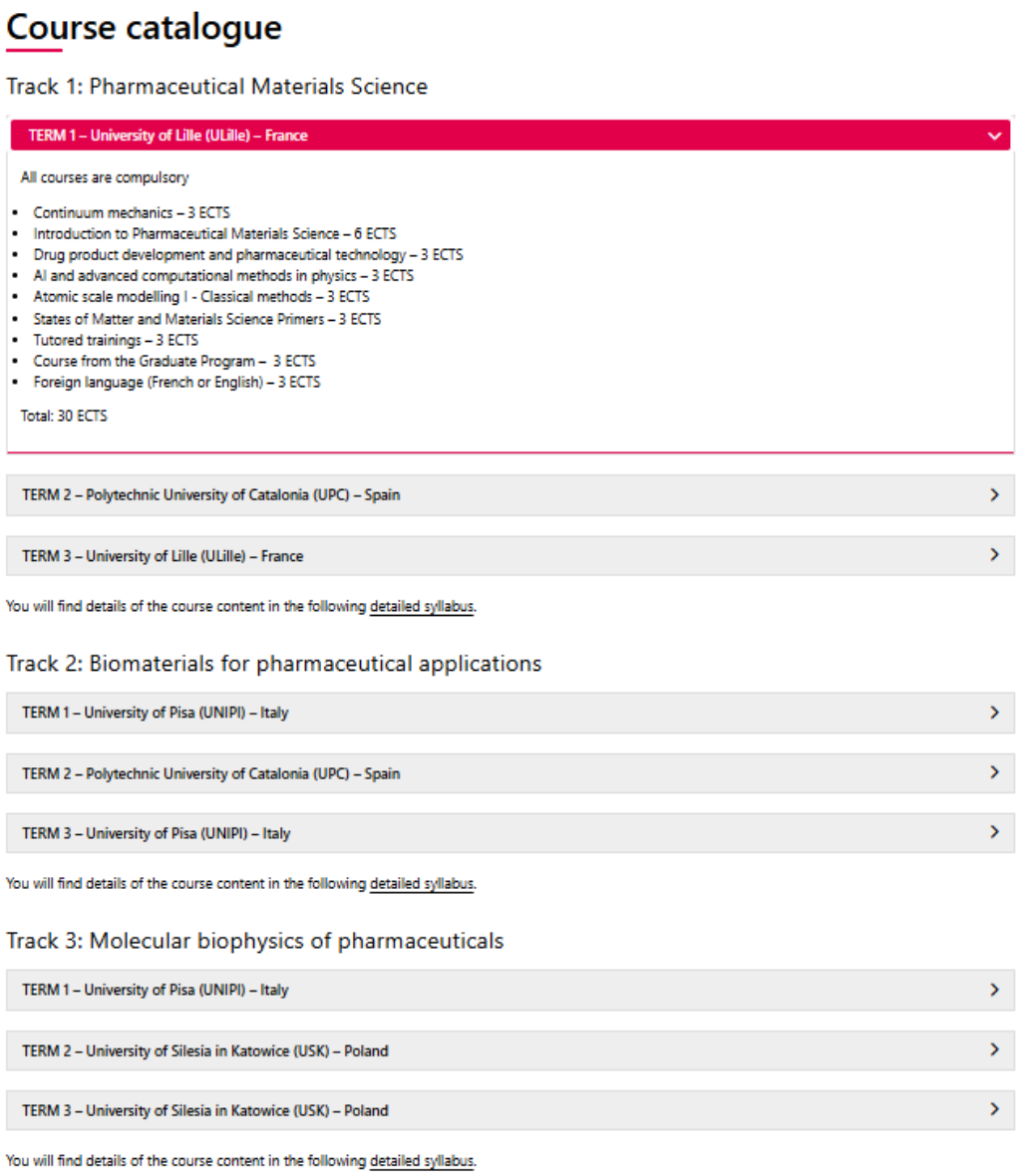
http://master-biopham.eu

The list of courses and syllabi are available on the BIOPHAM website



Course catalogue

Track 1: Pharmaceutical Materials Science

TERM 1 – University of Lille (ULille) – France

All courses are compulsory

- Continuum mechanics – 3 ECTS
- Introduction to Pharmaceutical Materials Science – 6 ECTS
- Drug product development and pharmaceutical technology – 3 ECTS
- AI and advanced computational methods in physics – 3 ECTS
- Atomic scale modelling I - Classical methods – 3 ECTS
- States of Matter and Materials Science Primers – 3 ECTS
- Tutored trainings – 3 ECTS
- Course from the Graduate Program – 3 ECTS
- Foreign language (French or English) – 3 ECTS

Total: 30 ECTS

TERM 2 – Polytechnic University of Catalonia (UPC) – Spain

TERM 3 – University of Lille (ULille) – France

You will find details of the course content in the following detailed syllabus.

Track 2: Biomaterials for pharmaceutical applications

TERM 1 – University of Pisa (UNIPI) – Italy

TERM 2 – Polytechnic University of Catalonia (UPC) – Spain

TERM 3 – University of Pisa (UNIPI) – Italy

You will find details of the course content in the following detailed syllabus.

Track 3: Molecular biophysics of pharmaceuticals

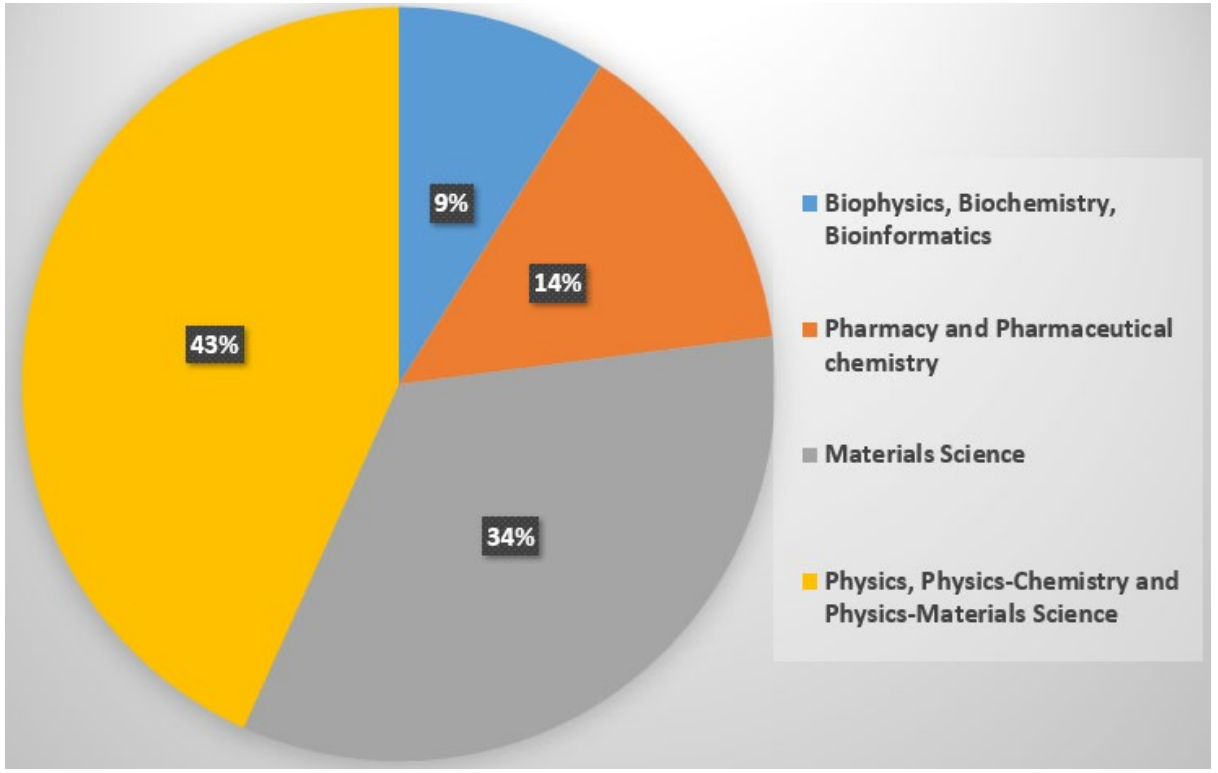
TERM 1 – University of Pisa (UNIPI) – Italy

TERM 2 – University of Silesia in Katowice (USK) – Poland

TERM 3 – University of Silesia in Katowice (USK) – Poland

You will find details of the course content in the following detailed syllabus.

Breakdown of the core fundamental and specialized courses offered in the BIOPHAM training programme

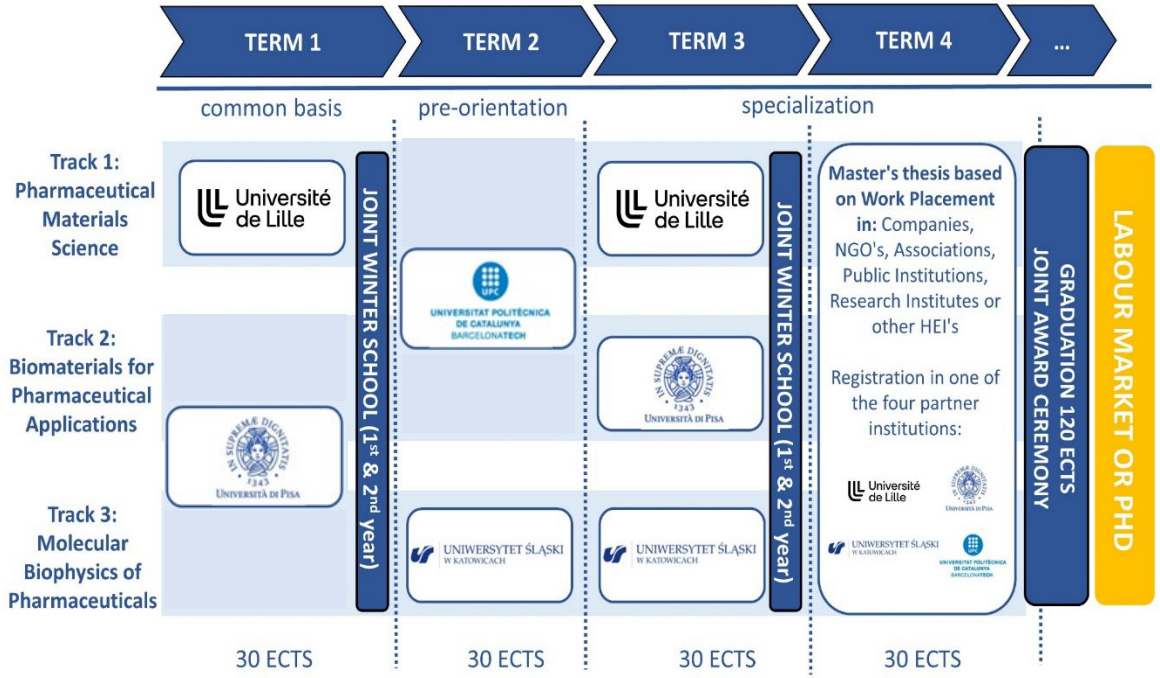


This breakdown does not relate to the type of studied systems (small molecules, polymers, proteins, hybrid systems) !

A course classified in “Physics” or “ Materials Science” can focus on proteins !

BIOPHAM Master
→ 2 to 3 degrees ☺

Students obtain the degree from all visited universities (Term 1 to 4)



Name of institution	Title of degree awarded in English
University of Lille (ULille) FRANCE	Master in Fundamental Physics and Applications Track: Bio and Pharmaceutical Materials Science
University of Pisa (UNIPI) ITALY	Master Degree in Materials and Nanotechnology
University of Silesia in Katowice (USK) POLAND	Master (Field: “biophysics”)
Universitat Politècnica de Catalunya (UPC) SPAIN	Erasmus Mundus Master in Bio and Pharmaceutical Materials Science (BIOPHAM)

+ joint diploma supplement: Providing detailed information about the student’s academic programme and achievements

What support BIOPHAM can offer to students ?

All students accepted into the BIOPHAM programme will benefit from the following support throughout the two years of the programme:

- **Tuition and Registration fee waiver** in all visited universities (University of Pisa, Polytechnic University of Catalunya, University of Silesia in Katowice or University of Lille)
- **Comprehensive health insurance**
- **Financial support** to attend key events (joint winter course, award ceremony)
- **Additional support for special needs**, available upon request, for students with disabilities or sensory impairments: [€3,000 to €60,000] per student

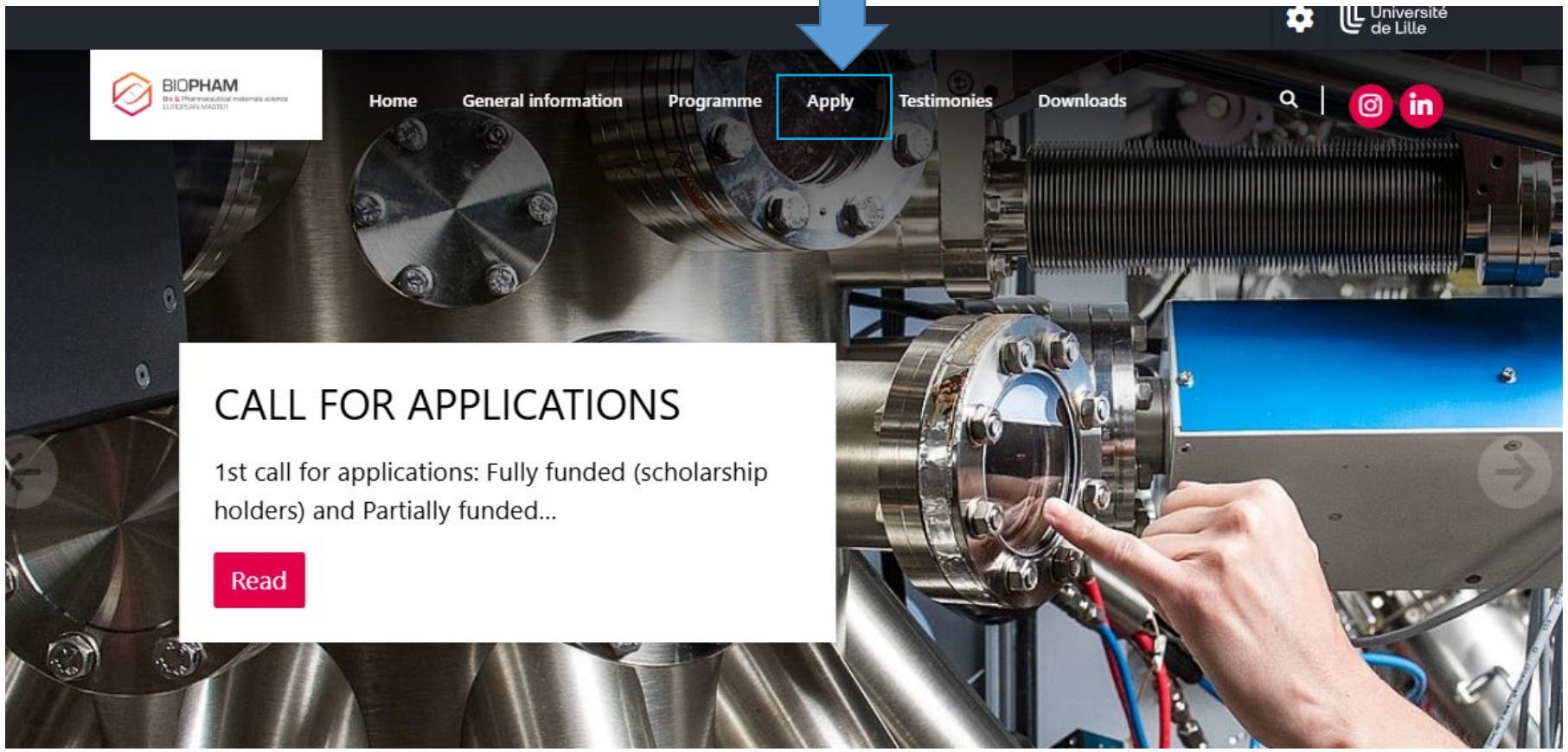
  Financial support for special needs : Contribution to cover the individual needs of students with disabilities (e.g. long-term physical, mental, intellectual, or sensory impairments): assistance such as by third persons, adaptation of work environment, or additional travel/transportation costs…

Scholarships: By applying to the BIOPHAM Master programme, students can also apply for a scholarship of €1,400 / month during the 2 years of the training programme

HOW TO APPLY TO BIOPHAM ?

https://www.master-biopham.eu

Click here !



SCAN ME !

IMPORTANT DATES

2 Calls for admission in Cohort 5 starting in September 2026

Call 1: Fully funded (with scholarship) and partially funded (no scholarship)

- Opening: November 1st 2025 (10:00 Brussels time)
- Deadline for electronic submission: February 1st 2026 (23:59 Brussels time)
- Interviews : March 2026
- Admission decision: Beginning of April 2026

Call 2: Partially funded (no scholarship)

- Opening: February 9th 2026 (10:00 Brussels time)
- Deadline for electronic submission: May 9th 2026 (23:59 Brussels time)
- Interviews : May 2026
- Admission decision: Beginning of June 2026

SELECTION PROCEDURE

1) Evaluation of the electronic applications

- All the applications are analyzed by one evaluator from each of the four partner Universities (University of Pisa, Polytechnic University of Catalunya, University of Silesia in Katowice and University of Lille)
  → each application is evaluated four times
- The evaluation is based on the transcripts, the academic background, the CV, the motivation and recommendation letters and the ranking of the university of the applicant
- Based on the average of the marks of the 4 evaluators: **first ranking list**

2) Interview and Admission

The best ranked candidates are invited for an oral interview (Zoom, Teams,…) to be scheduled in March 2026
This online interview will serve to assess:

- the level of English (minimum B2)
- the motivation to join BIOPHAM
- the overall level in physics, chemistry and mathematics by performing a short test

Based on the interview assessment: **final ranking list**

- Main List – Scholarship holders
- Reserve List – Non-scholarship holders
  Time is left for these applicants to benefit for potential drop-out from Main List applicants.
- Non-Selected List

What are your chances ?

INTAKE	Number of applications received	Number of students recruited	% success
1 [2021 – 2023]	188	15	8 %
2 [2022 – 2024]	200	26	13 %
3 [2023 – 2025]	380	25	7 %
4 [2024 – 2026]	415	21	5 %

Average age
Intake 1 → 23.4
Intake 2 → 23.9
Intake 3 → 24
Intake 4 → 23.6

Gender ratio Male/Female (%)
Intake 1 → 52/48
Intake 2 → 46/54
Intake 3 → 40/60
Intake 4 → 35/65

5 [2026 – 2028]	?	About 20: 12 with scholarship 8 with no scholarship	?

To get a scholarship: very (very) competitive !

To join without scholarship: you just need to be a « good student » !

2 MAIN RECOMMENDATIONS

1. Check if the field of study of your bachelor is eligible or not in the section "Who can apply ? "

The eligible field are the following:

- **Physics** (including Fundamental physics, Engineering physics, Physics-Chemistry, Biophysics)
- **Materials Science** (including Materials science & Engineering, Metallurgy and Materials Engineering, Metallurgical Engineering, Materials Science & Materials Technologies, Polymer Materials and Engineering)
- **Chemistry** (including Chemical Engineering, Chemistry and Food Technology)
- **Biomedical Engineering & Bioengineering**
- **Nano**technology, Nanotechnology Engineering, Nano-engineering, Nanoscience

Examples of some typical non-eligible fields: Biochemistry, Bioinformatics, Biological Pharmaceutical Chemistry, Biomedical Science, Biomedical Technology, Biology, Biotechnology, Botany, Health Science, Industrial Bioprocesses Engineering, Medicine, Medical technology, Medical Laboratory Technology, Medicinal chemistry, Microbiology, Molecular Biology, Nursing, Nutrition and Dietetics, Pharmaceutical and Health Sciences, Pharmaceutical manufacturing technology, Pharmaceutical Sciences, Pharmacy, Reproductive health, Surgery, Textile Engineering, Zoology

2. Do not apply late !

The next deadline is February 1st 2026

In general, 50% of applications submitted the day of the deadline (~ 200) are rejected because some documents (CV, transcripts, motivations or recommendation letters,…) are missing ☹

1433 applications currently in preparation on the electronic platform
(checked on January 7th)

JOIN US !
We are waiting for you !

BIOPHAM

Bio & Pharmaceutical materials science
EUROPEAN MASTER

SCAN ME !

THANK YOU