



UNIVERSIDAD  
**COMPLUTENSE**  
MADRID



FACULTY  
OF CHEMISTRY SCIENCE  
**MASTER'S DEGREE IN**  
MOLECULAR  
NANO-AND BIO-PHOTONICS  
ERASMUS MUNDUS

# Master's Degree in MOLECULAR NANO-AND BIO-PHOTONICS Erasmus Mundus

Branch of Knowledge

Sciences

Centre Responsible

Ecole Normale Supérieure de Cachan (France)

Joint:

Faculty of Chemistry. UCM (Spain) -

Wrocław University of Technology

(Poland) - University of Wrocław (Po-

land) - Université de Paris V -Descartes

(France)

**Orientation:** scientific-academic

**Credits:** 120 ECTS

**Duration:** 2 academic years (4 semesters)

**Mode:** classroom learning

[www.monabiphot.ens-cachan.fr](http://www.monabiphot.ens-cachan.fr)

## Objectives

The The Master's "Molecular Nano- and Bio-Photonics" (MONABIPHOT) is included in the Erasmus Mundus, European Union Master's Degree programme (European Commission of Education and Culture), awarded in 2012 (Ref. 532665-1-FR-2012-1-ERA MUNDUS-EMMC). It is carried out under the MONABIPHOT Consortium made up of five European associates (ENS Cachan and UPAD, France; WRUN and WUT, Poland; and UCM), as well as non European partners, and the participation of some companies.

The Master's has the following main objectives:

- To offer students broad multi and interdisciplinary training in the field of bio-photonics, with an overview of multiple applications such as data processing and transmission, focusing on biological aspects to help achieve a better understanding of diseases such as cancer, among others.

- To provide the labour market with highly qualified individuals with an extensive knowledge of biotechnology and optical sciences, and a real capability to adapt to many quickly changing technological developments and find new solutions to science and technology challenges.

## Target

Graduates with a minimum of 180 ECTS in the fields of science or engineering (Physics, Chemistry, Biochemistry, Electrical Engineering, Materials Science...). Knowledge of English is required (with supporting documentation).

## Why study this Master's?

The students of this Master's will acquire a broad spectrum of skills in various photonics applications for biotechnology. They will acquire basic general knowledge of the physical, chemical and biological implications of photonics, with a strong orientation towards life sciences, which will allow them to adapt to the fast changes taking place in the examination tools and applications of this field.

The wide range of competencies, attained not only in general but also with a more specialised and innovative perspective, will provide students graduating with this Master's with a great variety of professional opportunities, both in academic careers and in high technology divisions of optoelectronics and biotechnology companies.

The typical distribution of alumni of this MONABIPHOT Erasmus Mundus Master's is: 75% in doctoral studies, 15% in companies, 5% in an MBA, 5% in another situation (data from the first three cohorts).

## Structure

The Master's is divided into modules and subjects, in accordance with the requirements for an Erasmus Mundus Master's Degree. The two first modules are taken only in the ENS of Cachan and the UPAD, while the third and fourth are taken according to the pathway selected by the student. The fifth module, which is a Final Project, may be taken at any consortium centre or even outside centres. In addition, other modules

include: Interdisciplinary Module (compulsory, 6 ECTS), Summer School (compulsory, 2 ECTS) and Module on Entrepreneurship (elective, 3 ECTS). Credit distribution depends on the pathway chosen by the student.

For EU students, there is the possibility of a 3-month stay in an institution outside the EU, at any time during the two years of the Master's (except during the first month and the Summer School), to conduct a study and/or research project aligned with the objectives and contents of the Erasmus Mundus Master's. Those students may take subjects

for a maximum of 15 credits in third-country universities.

## Syllabus

Type of subject	ECTS
Compulsory*	69
Elective	21
Final Project	30
<b>Total</b>	<b>120</b>

\* Maximum number of compulsory credits for students following the UCM itinerary, including the maximum from the Basic Module and the Interdisciplinary Module.

Subjects	Semester
<b>Module 1: Basic Module (ENS Cachan, France)</b>	
Subjects on Fundamentals of Mathematics, Physics, Biology, Chemistry	1°
<b>Module 2: (ENS Cachan, UPAD, France)</b>	
Subjects on physical bases of Photonics and Device Engineering (ENS Cachan)	1°
Subjects on aspects of Biology (UPAD)	1°
<b>Module 3: (Mode A: UCM; Mode B: WRUN, Poland)</b>	
Mode A: carried out at UCM	
Subjects on aspects related to Organic Materials, Inorganic Materials and Sensors, with a special focus on those of a Nanometric nature	2°
Mode B: carried out at the University of Wrocław (WRUN), Poland	
Subjects on aspects of Biochemistry and Modelling	2°
<b>Module 4: (Mode A: ENS Cachan, UPAD, France; Mode B: WUT, Poland)</b>	
Mode A: carried out at the ENS of Cachan and UPAD, France	
Life Sciences and other advanced subjects on Photonics oriented towards Data Processing and Biological Applications	3°
Mode B: carried out at the Wrocław University of Technology, Poland	
Subjects on Life Sciences, with a greater emphasis on Biomaterials, Modelling and Device Physics	3°
<b>Summer School</b>	
<b>Interdisciplinary Module</b>	
<b>Module on Entrepreneurship</b>	
<b>Final Project</b>	
Final Project	4°



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For further information: [www.monabiphot.ens-cachan.fr](http://www.monabiphot.ens-cachan.fr)