



NANO2MC

2024 - 2025

NANO2MC - Introduction

Introduction

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The programme trains in the multidisciplinary aspect of nanotechnologies and offers five specialisations:

- nanophysics: quantum phenomena, molecular transports, spintronics, simulation, physical characterisations, etc.;
- nanochemistry: synthesis of nanoparticles, chemical and physico-chemical characterisation, quantum chemistry, etc.;
- nanoelectronics: micro- and nanoelectronics, MEMS, NEMS, electronic characterisation, etc.;
- nanomaterials: nanocomposites, nanothreads, nanotubes, polymers, etc.;
- nanobiotechnologies: biomaterials, biophysics, nanomedicine, biosensors, etc.

The Advanced Master in Nanotechnology is an inter-university. The Université catholique de Louvain is co-certifying this Master's degree with the Université de Namur, the Université libre de Bruxelles, the University of Liège and the Université de Mons. UCLouvain is the reference institution and is responsible for the administrative management of the program (administration, registration, etc.).

Your profile

This programme is accessible to:

- holders of a master (120) in engineering sciences;
- holders of a master degree (120) in agronomic sciences and bioengineering, sciences, biomedical and pharmaceutical sciences, as well as holders of the academic degree of master in Business Engineering: upon application for admission;
- holders of Belgian and foreign second-cycle degrees: upon application for admission.

Your programme

In each of the specialisations, the training programme is composed of at least 60 credits.

This programme includes:

- a common core of 30 credits including a research work (thesis) done in a laboratory of one of the six institutions organising the Master (27 credits), transversal seminars and a personnel work (3 credits);
- a specialised training (8 to 15 credits);
- options in the form of courses of your choice (15 to 22 credits).

NANO2MC - Teaching profile

Learning outcomes

The Advanced Master in Nanotechnology offers holders of a basic second cycle degree complementary and/or advanced second cycle training in the fields of nanoscience and nanotechnology. It is intended for, on the one hand, those who do not have any training in this field and who wish to specialise in it, or on the other hand, for those who have already taken an option in this field during their Master's and who wish to further their training with a specialisation in another area of nanotechnology, e.g. an electrical engineer wanting to further his/her training in nano-biotechnology.

The Advanced Master in Nanotechnology is a program of 60 credits organised around five main areas of specialisation:

- nanophysics: quantum phenomena, molecular transportation, spintronics, simulation, physical characterisations ...
- nanochemistry: synthesis of nanoparticles, chemical and physico-chemical characterisation, quantum chemistry
- nanoelectronics: micro and nanoelectronics, MEMS, NEMS, electronic characterisation ...
- nanomaterials : nanocomposites, nanofilms, nanotubes, nanomedicine, biocaptors ...

This program is also intended to train students in the multidisciplinary aspect of nanotechnology. To this end it puts the accent on the different approaches used in these fields : knowledge of basic phenomena at the nano level, nanomanufacturing or the synthesis of nanostructures, the characterisation of nanostructures and the modelling and numeric simulation at the nano level

It also aims to make students aware of the impact on society of nanotechnology by way of interdisciplinary seminars on the following themes : ethics, economic perspectives, applications of nanotechnology, toxicity of nanomaterials ...

On successful completion of this programme, each student is able to :

1. mener à son terme une démarche multidisciplinaire de recherche appliquée à la conception et à la fabrication d'un objet fonctionnel dont la taille se situe entre 1 et 100 nm et notamment d'être en mesure d'appliquer au moins deux des quatre compétences suivantes :
 - 1.1. utilisation des notions de phénomènes fondamentaux à l'échelle nanoscopique en vue de concevoir des objets et de matériaux aux propriétés nouvelles,
 - 1.2. synthèse de nanomatériaux ou fabrication de nanostructures fonctionnelles en laboratoire,
 - 1.3. caractérisation des nanostructures pour en connaître la structure et/ou des propriétés fonctionnelles,
 - 1.4. modélisation ou simulation numériquement à l'échelle nanoscopique, en utilisant des outils non-conventionnels, pour prédire des propriétés de l'objet, du matériau ;
2. appliquer la démarche complète de recherche au développement d'un objet fonctionnel dans l'un des domaines suivants : nanophysique, nanochimie, nanoélectronique, nanomatériaux, nanobiotechnologies ;

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3. estimer l'impact des nanotechnologies sur l'environnement, la santé, le développement économique, l'emploi ;

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4. organiser son travail de recherche, en équipe de laboratoire, pour le mener à bien
 - 4.1. formuler le cahier des charges du nanomatériau ou du nanodispositif,
 - 4.2. se documenter et résumer l'état des connaissances actuelles dans le domaine de recherche en nanotechnologie,
 - 4.3. mettre en forme un rapport de synthèse visant à expliciter les nouvelles propriétés de l'objet, du matériau, son domaine d'application,
 - 4.4. communiquer oralement et par écrit (sous forme d'article scientifique) les résultats de sa recherche à une équipe d'experts dans le domaine des nanotechnologies.

Programme structure

In each of the areas of specialisation, the program involves a minimum of 60 credits. This program comprises :

- a core curriculum of 30 credits consisting of
 - . a research work (thesis) carried out in a laboratory of one of the six institutions organising the Master's (27 credits)
 - . interdisciplinary seminars and an individual assignment (3 credits) : students follow seminars common to the various streams and do an assignment on some interdisciplinary themes such as ethics, economic perspectives, applications of nanotechnology, toxicity of nanomaterials ... ; these seminars are organised in turn by the program partners in the form of thematic days ; the interdisciplinary seminars are compulsory for all the streams and involve all the Master's students.

ENANO2803

ENANO2501

Simulation en Physique des Matériaux

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The programme's courses and learning outcomes

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

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Management Committee to be similar to one of the above-mentioned degrees. The Management Committee decides on the basis of the application submitted by the student.

3) Access to the Advanced Master in Nanotechnology is conditional for holders of a Master's degree 120 other than those listed in 1) and 2), as well as holders of a second cycle foreign degree of at least 300 credits. The enrolment procedure is identical to that in 2).

Applications received will be subject to scrutiny by the program committee with a view to admission. The admission application should contain the following items :

- Motivation letter
- Complete resume
- Copies of the Bachelor and Master's degree or a document listing successful completion of the program
- All transcript of records of the Bachelor and Master studies testifying of the successful valorisation of 300 credits

A selection interview may be organised to make sure that the applicant properly masters the basic concepts needed for the study program.

A maximum of 15 credits of prerequisites may be imposed on candidates covered by points 2) and 3).

Special admission and registration procedures

Students who do not hold a Master's degree in Civil Engineering awarded in the French-speaking Community of Belgium must submit an application for admission to the Master's Management Committee (see above) at the time of their application, which will be assessed by the Master's Management Committee.

Teaching method

The Advanced Master in Nanotechnology is a resolutely multidisciplinary program, the objective of which is to train students in both theoretical, and experimental and applied approaches in the field of nanotechnology.

By its structure of leaving a very wide choice of courses, this program allows students to construct a program to suit them and their personal needs.

A variety of the learning structures and scientific approaches is provided by the inter-university organisation of the program.

Evaluation

The evaluation methods comply with the [regulations concerning studies and exams](#). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

The learning activities are evaluated according to the regulations in force at the university (see the examination regulations), viz. written and oral examinations, laboratory examinations, individual or group assignments, public presentations of projects, thesis.

To obtain a student's average, the grades awarded for each course unit are weighted by their respective credits.

Mobility and/or Internationalisation outlook

To allow access to the Master's program to non-French speaking students, a major part of the program will be given in English.

Most of the laboratories of the teachers involved in the Master's program belong to European networks of excellence (FAME, SINANO, NANOSIL, ...), and international research programs.

Possible trainings at the end of the programme

With its training and research components, the Advanced Master in Nanotechnology also prepares students for the PhD program. Most of the teachers involved in the Master's are members of the thematic doctoral school MAIN (Science et Ingénierie des Matériaux, des Interfaces et des Nanostructures) which can supervise students wishing to do a PhD.

Contacts

Curriculum Management

Entity

Structure entity

SST/IMCN/BSMA

Denomination

(BSMA)

(IMCN)

Sector

Sciences and Technology (SST)

Acronym

BSMA

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Jury

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