Université Claude Bernard Lyon 1

MASTER OF PHYSICS

MAJOR IN PHYSICS

with specialist option in Optics, Atomic and Molecular Physics and Environment (OPAME) (Research/Professional)

or with specialist option in Condensed Matter, Nanostructures and Applications (MCNA) (Research/Professional)

or with specialist option in Subatomic Physics, Astrophysics and Radiations (PSAR) (Research) (Research)

or with specialist option in Complementary Skills in Computer Science (Professional)

Objectives

The Master of Physics aims to provide training and courses for students either intending to continue to research at the PhD level in physics and astrophysics or intending to pursue a professional career with a qualification in Physics.

The first year of the Master of Physics offers an international syllabus, with lectures given both in English and French to introduce foreign students to the French University system and to help French students to prepare for a future activity abroad, either in research or industry.

The **Subatomic Physics, Astrophysics and Radiations (PSAR)** option is intended for students who will go on to a PhD in the fields of Nuclear Physics, High Energy Physics, Astrophysics and Astroparticles or Theoretical Physics.

The **Optics, Atomic and Molecular Physics and Environment (OPAME)** option is aimed at students who will go on to a PhD in the fields of Atomic and Molecular Physics extending to biomolecules, clusters and nanostructures, radiation-matter interactions and Environmental Physics. This specialization also includes the professional syllabus **Characterisation and Management of the Atmosphere (CGA)** allowing the students to acquire the expertise required by the public and private industrial sectors. The jobmarket has led this program to focus on multidisciplinary knowledge, recognition and analysis of the complex processes taking place in the atmosphere and their environmental and socio-economic consequences. There is a growing demand in this field initiated by local and State governments' desire to develop an environment-friendly way-of-life and to respect the strict regulations imposed by European legislation. The physics-based course includes appropriate contributions in the fields of chemistry, engineering, medicine and law. The professional syllabus includes lectures by instructors from the private sector and an industrial placement.

The **Condensed matter, Nanostructures and Applications (MCNA)** option is designed for students intending to go on to a PhD in the field of condensed matter, solid state physics, soft matter physics, nanophysics and nanotechnologies. It takes in the full professional syllabus **Nanomaterials and Nanotechnologies (N2MT)** which provides expertise required by the public and private industrial sectors. Nanoscience is an emerging field where fundamental science and technology meet. It aims to develop nanometre scale systems where the surface properties dominate over the volume properties using the laws of quantum physics and material science in order to exploit new characteristics and conceive new products. This professional syllabus is open to students coming from disciplines other than Physics (for instance mechanical engineering, chemistry, biochemistry or biology, ...) who seek a complementary training in Nanomaterials and Nanotechnologies. This syllabus aims at developing the culture of nanotechnologies in an increasingly global and diversified industrial environment.

The **Complementary Skills in Computer Science** option is intended to students who seek complementary skills in computer science with training in industrial production and management (product R&D, planning, production control and maintenance), networking and distributed applications.

Head of department : Pierre-François Brevet
Tel : 00 33 472 44 58 73
E-mail : pfbrevet@lasim.univ-lyon1.fr

SOIE service d'orientation et d'insertion professionnelle des étudiants
http://soie.univ-lyon1.fr

Université Claude Bernard Lyon 1
43 Boulevard du 11 Novembre 1918
F - 69622 Villeurbanne cedex
Web site: http://offre-de-formations.univ-lyon1.fr
Web site: http://master-physique.univ-lyon1.fr

Conditions for admission

Year 1 (M1) Students having acquired 180 ECTS in an STS Licence (= Bachelor). Foreign students may be admitted with an equivalent degree upon approval from the admission committee. Students from engineering schools may also be admitted after approval of the admission committee.

Year 2 (M2) Students having obtained 60 ECTS in the M1 Physics program with approval from the admission committee, students with 60 ECTS in a M1 program in Biology, Chemistry, Geology, etc... or students from engineering schools may also be admitted upon approval from the admission committee. Foreign students and candidates from continuous education after review and approval by the admission committee.

Continuing studies

- **Preparation of a PhD at the University of Lyon or in another university in France or abroad. The "doctoral schools" at the University of Lyon are:**
  - Doctoral School in Physics and Astrophysics (PHAST),
  - Doctoral School in Material Science
- **Preparation to sit the French teaching diploma exam** (secondary or higher education – CAPES or agrégation),
- **After Year 1 (M1),** application based on results or entrance examination to French engineering schools or business/management schools.

Skills

Research skills
In theoretical aspects of physics from condensed matter down to the ultimate constituents of matter,
In analytical methods in material science, optics, lasers and fundamental particles detection,
In modelling and/or simulating physical phenomena to understand the underlying mechanisms,
In the design and/or simulation of experimental devices to observe physical phenomena,
In data analysis with assessment of data quality prior to analysis

Professional skills
In the most recent techniques in experimental physics for a given area of application,
In the theoretical physical principles underlying analytical techniques,
In the awareness of the current applications in R&D in environmental science,
In the design of experimental procedures for a specific project
In experimental or industrial procedures to match quality control standards

Cross-disciplinary skills
Master programming languages
Model physical problems
Use computer networks
Project organization, making contacts
Compile a report on a project
Oral presentation of results
Work in a research team
Participate in a group project
Meet specifications and requirements in a project
Provide progress reports to collaborators on a project
Use basic Information and Computing Technology,
Perform a bibliographic research
Maintain a specialized documentation,
Maintain awareness of technological advances,
Work in an international environment, in communicating, presenting and publishing results in English

Professional work placement

The Master of Physics can lead to employment in the following sectors:

Teaching (CAPES, CAPET, Agrégation = French teaching accreditations) following the competitive exams for teachers in the public sector (civil servants) usually prepared at the IUFM at the University or the École Normale Supérieure (ENS).

Research Engineer in basic research Designing and conducting projects in basic research to acquire abstract or speculative knowledge. Creating representative diagrams and verifying the hypotheses with appropriate experiments. Elaborating and organising theoretical interpretations of the experiments and the analyses. Carrying out prospective work on natural phenomena. Providing follow up on work and discoveries via different means (publications, conferences etc...) (ANPE-ROME 53121)

Technical manager in environment Managing, analysing and solving problems linked to the protection of nature and the improvement of the lifestyle (waste disposal and recycling, air and water quality, control of various pollution sources including noise pollution etc...). Depending upon the area of application, guaranteeing prevention and correction measures, including research and awareness campaigns. Being responsible for the development of "clean" technologies, creation of storage site installations, maintenance of the installations or administrative and financial management of a structure. (ANPE-ROME 53131)

Sales and technical manager Prospecting the potential market (client files and virtual clients). Selling standard industrial products (equipment etc...) or products adapted to the specific needs of the clients. Launching or responding to bids to obtain contracts concerning the creation of particular industrial projects. Participating in the definition of company commercial policies. Providing clients with technical assistance, as well as, after-sales service. (ANPE-ROME 53311)

Head of quality control analysis laboratories Defining, designing, organizing and setting into place the different procedures which guarantee the product quality. Supervising and following up the control of raw materials, means of production, semi-finished and finished products. Participating in the improvement of manufacturing procedures, production organization and production equipment. Managing technical or management teams. Managing the department's budget. Coordinating all the quality control actions of the company. (ANPE-ROME 53212)

Sectors of activity

Environment
Nanoelectronics
Nanomaterials
Petroleum industry
Biotechnology
Biomedical
Radio protection
Consultants/research consultancy
Audit
Government laboratories (CNRS) (admission determined by competitive exam)
Teaching (competitive exam)
Measuring, control and modelling systems equipment industry
Nuclear and petrochemical industry
Pollution control laboratories and associations
Government institutions in industrial hygiene procedures qualification
Material transformation industry (cement, chemical industry etc.)
Medical diagnosis industry
Optic and optoelectronic industry