POLYTECH©
CLERMONT

GRADUATE SCHOOL OF ENGINEERING
CLERMONT INSTITUT OF TECHNOLOGY | **UNIVERSITÉ CLERMONT AUVERGNE**

INTERNATIONAL PROGRAM

MASTER LEVEL
ENGINEERING PHYSICS

in POLYTECH CLERMONT

DURATION

1 semester
(Fall or Spring)

or 1 year
(October to June)

Total ECTS Credits 60

OBJECTIVES

The aim of the Master program in engineering physics is to bring international students the theoretical and practical backgrounds required by industry leaders in engineering physics.

Different formula are offered to international students: one semester (Fall or Spring, 30 ECTS) or one full year (60 ECTS).

The educational program is based on scientific and technological multidisciplinary approaches, from condensed matter physics, applied physics, physico-chemistry, chemical engineering, advanced numerical analysis, to nuclear energy. The program includes academic and practical sessions, research projects and an internship, depending of the chosen formula. The objective of the projects is to reinforce the assimilation of the theoretical background tackled during the practical sessions.

Highly qualified researchers recognized for their scientific and pedagogical skills, coming from various French laboratories, guide the program.

International students spending one year will attend a research internship at the end of the year in addition to research projects.

WHERE ?

PARIS

CLERMONT-FERRAND

NICE
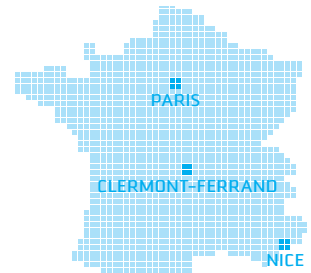
FALL SEMESTER
(September to December)
SCIENTIFIC COURSES 18,5 ECTS

APPLIED PHYSICS 1
➔ 2 ECTS

1. Electronics
2. Fluid Dynamics

Characterization of a fluid and basic equations of a fluid motion – Basics in the physics of elementary electronic components and application

QUANTUM PHYSICS 1
➔ 5,5 ECTS

1. Mathematical Tools
2. Quantum Physics

To apprehend condensed matter physics and its main laws at submicroscopic scale – up to date knowledge in the modeling of micro- and nano-materials

Mathematical tools for the modeling the fundamental phenomena of continuous or discrete media

MATTER AND RADIATION 1
➔ 4 ECTS

1. X-Ray Diffraction
2. Solid State Physics 2 : heat capacity, dielectric and magnetic properties

Physical analysis of solid materials – link to the observed state or the elaboration process

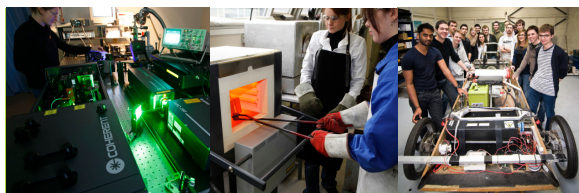## PHYSICO-CHEMISTRY 2
➔ 4 ECTS

1. Interfaces
2. Practical Training

Panorama of the liquid/solid or liquid/gas interface phenomena

NUMERICAL METHODS ➔ 3 ECTS
Numerical methods for transport phenomena

Fundamental basics in transport phenomena modeling and simulation with FVM and FEM techniques

CONTENT

SPRING SEMESTER
(January to June)
SCIENTIFIC COURSES 12,5 ECTS

PHYSICS OF FIELDS
➔ 3 ECTS

1. Waves and Magnetism
2. Heat Transfer

Fundamental basics in physics of complex systems involving advanced phenomena in electricity, optics and heat transfer

CONDENSED MATTER PHYSICS 1
➔ 4 ECTS

1. Geometrical cristallography
2. Solid State Physics: lattice vibrations, electronic states
3. Statistical Physics

Going from microscopic to macroscopic scale: vibrational, electronic and magnetic properties of matter – Electromagnetic wave propagation

ENGINEERING PHYSICS ➔ 2 ECTS

1. Physico-Chemistry 1

To master the characterization techniques in physico-chemistry of materials

MATTER AND RADIATION 2 ➔ 3,5 ECTS

1. Generalized functions: theory and application Spectroscopies
2. Nuclear Energy

Fundamental basics in nuclear physics and application – Solid knowledge in characterization of materials based on spectroscopy by coupling with quantum mechanics

FALL OR SPRING SEMESTER
(September to June)
TRAINING COURSES 15–20 ECTS

INDIVIDUAL RESEARCH PROJECTS
➔ 10 ECTS
In relation with supervisors specialized in engineering physics (material science engineering, heat transfer, computational fluid dynamics, physico-chemistry, chemical engineering, biomaterial engineering) affiliated to different Laboratories on the Cézeaux campus, the objectives of the individual research projects will be to develop innovative techniques, strong competences or deepen scientific knowledge.

INTERNSHIPS IN RESEARCH LABORATORIES (2 MONTHS)
➔ 10 ECTS
An internship is encouraged to be a unique international experience for doing research. International students will be host by Academic French Laboratories on the Cézeaux campus for a 2 month internship in the fields of Engineering Physics.

ADMISSION REQUIREMENTS

Bachelor level - Resume with 240 European credits (ECTS), specialization in Physics

ENGLISH PROFICIENCY

The minimum required is the level B1 of the Common European Framework of Reference for Languages evaluated by English tests as follow: Paper-based TOEFL score = 475, Internet-based TOEFL score = 50, TOEIC score = 550, IELTS = 4.5, Cambridge = FCE, etc.

FRENCH PROFICIENCY

No minimum level of French is expected when entering the program. However, to pass successfully the program, it would be required, at the end of the program, to pass a French test at which a minimum score must be attained. French courses are highly recommended to be taken at the center of French learning FLEURA in Clermont-Ferrand.

APPLICATION PROCESS AND DEADLINES

Applications will be made through the international office of the sending university for nomination. Selection of the candidates will be made by Polytech.

Deadlines to apply
- Fall semester: 15 May
- Spring semester: 15 October

FOCUS ON…

POLYTECH NETWORK

Polytech is a group of 15 public faculties dedicated to higher education, research and innovation in engineering. These institutions, under the authority of the French Ministry of Higher Education and Research, form a network of 14 French universities, sharing a unique model for their 14 faculties of engineering. All 86 different curricula of Polytech correspond to the 86 Masters in engineering degrees (Diplômes d'Ingénieur) that are accredited by CTI (Commission des Titres d'Ingénieur).

All curricula are classified into 12 different scientific fields. Polytech group includes 68 000 alumni and more than 3000 new Masters graduates every year. Geared towards industrialists and economic stakeholders, the graduates are acknowledged for their excellence at national and international level generating numerous job opportunities.

With a staff community of more than 1300 faculty-members, Polytech group supports excellence in 125 research laboratories. More than 1 000 qualified lecturers from companies in all professional sectors also contribute to taking up the challenges in engineering education of the graduate students.

POLYTECH CLERMONT

Founded in 1969, Polytech Clermont is one of the oldest engineering universities in France. Polytech Clermont-Ferrand is a founding member of the Polytech network, and has developed its development in this context, both locally and nationally and internationally.

Key figures
- + de 1000 student engineers and apprentice engineers
- + 7000 graduate engineers
- 6 engineering degrees
- 80 teacher-researchers faculties
- 15% of training provided by nearly 150 industrial players
- 10 associated research laboratories

Polytech Clermont-Ferrand is the Graduate School of Engineering of Clermont Auvergne University.

With six different diplomas through initial and continuing training, Biological Engineering, Civil Engineering, Electrical Engineering, Mathematical Engineering and Modeling, Engineering Physics, Production System Engineering, Polytech Clermont-Ferrand has trained nearly 6000 engineers since its inception.

The policy of partnerships with national and international entities, inscribes the school in major projects like several European projects, in close connection with the regional competitiveness clusters. Several companies have been created by young graduate engineers; The 2 000 months of internships per year in industrial environments and the abundant contracting activity of the support laboratories testify to the vitality of the school in terms of industrial and entrepreneurial relations in all its fields of training.

CLERMONT AUVERGNE INP uca | POLYTECH CLERMONT

CONTACT DETAILS
Joel.leymarie@uca.fr / Jane.roche@uca.fr

POLYTECH Clermont
Campus universitaire des Cézeaux
2, av. Blaise Pascal - TSA 20206 - CS 60206 - 63178 Aubière Cedex - FRANCE

Tél. : (33) 4 73 40 75 00

www.polytech-clermont.fr