Study physic The Fac discipli ranging annlica

Study at the faculty physics and engineering

The Faculty offers a broad training in the disciplinary fields of physics and engineering, ranging from elementary particles to applications in mechanics and electronics, including condensed matter physics, materials science and nanosciences. It is located on three sites: Historical campus, Cronenbourg and Illkirch.

Our training offer is made of around twenty degree courses, including 9 work-study courses (apprenticeship and professionalization contracts), 8 training courses in international partnership and 5 co-authorizations with engineering schools. This broad and diversified training offer is strongly backed by nationally and internationally recognized laboratories, which gives it high visibility.

Master

English version

Sciences and technology major in physics

Specialty condensed matter and nanophysics | MCN

The specialty Condensed Matter and Nanophysics (MCN) is one of the six specialties offered in the second year (M2) of the Master of Physics of Strasbourg. The MCN specialty aims to provide physicists with a broad fundamental training, suitable for both experimental and theoretical research.

The MCN curriculum includes core advanced courses on quantum mechanics applied to condensed matter physics, statistical physics and radiation-matter interaction. In parallel, students can, through their choices of elective courses, orient their training either towards quantum sciences and nanomaterials (electronic, optical, magnetic, spintronic properties of low-dimensional, mesoscopic or open quantum systems...), or towards the physics of soft condensed matter and complex systems (surfaces and interfaces, complex fluids, colloids, active matter...).

₿ More information on physique-ingenierie.unistra.fr



Training

🖽 Duration of the course: 2 years

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Programme and courses

M1 (Taught in English)

Semester 1 (S1) in Strasbourg

- Quantum mechanics and statistical mechanics (112h)
- Programming and actual research (58h)
- Experimental physics (60h)

1 free UE + 2 optional courses (56h) :

- Mechanics of continuous medias (in French)
- Astrophysical objects and their observations
- Group theory
- Ionizing radiation and detection methods
- General relativity
- Direction of time & Advanced statistical mechanics
- Variational principles and analytical mechanics
- Elements of quantum theory of collisions
- Photonics for quantum science and technology
- Soft condensed matter
- Project

Semester 2 (S2)

- Nuclear physics and elementary particles-Solid state physics (112h)
- Computer programming and numerical simulations (22h)
- Laboratory physics (16 days)
- 1 free UE + 1 optional course (56h) :
- Particles and astroparticles
- Stellar physics
- Atomic and molecular physics
- Introduction to physics of living systems
- Relativistic quantum mechanics
- Numeraical methods in physics
- Electronics for quantum science and technology
- Critical phenomena and non-equilibrium statistical physics
- Project
- M2 (Taught in English)
- Advanced quantum mechanics : applications to condensed matter (42h)
- Advanced statistical mechanics : out-of equilibrium processes (42h)
- Radiation-matter interaction : applications to condensed matter (42h)

1 free UE + 1 optional course (72h) :

- Magnetism and magnetic nanostructures
- Spintronics
- Low dimensional nanostructures : electronic properties
- Theory and computational modeling of the
- electronic structure of materials
- Many-body physics applied to condensed matter
- Open quantum systems
- Electronic dynamics : charges and spins
- Local spectroscopies
- Surfaces and Interfaces in soft condensed matter
- Interactions in soft condensed matter
- Dynamical properties of complex systems
- BiophysicsCours
- Computational project
- Optical microscopies
- Scattering techniques for condensed matter
- Electronic microscopies

Targeted skills

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- Basic skills in the Physics of Condensed Matter, as well as in advanced techniques of instrumentation and scientific programming.
- Transverse skills: an ease to work in an English environment (the M2 lectures are conducted in English), introduction to a research activity carried out at the international level, numerical methods for data treatment and simulations.

Sciences quantiques & nanomatériaux | OMat

Les Instituts thématiques Interdisciplinaires Partnership → de Université de Strasburg is is in the de Consernation of the Consernation of the

In association with the (QMat) : Quantum science and nanomaterials.

Local laboratories →

- Institute of physics and chemistry of materialsof Strasbourg (IPCMS)
- Institute Charles-Sadron (ICS)
- Institute of science and supramolecular engineering (ISIS)
- Electronic department of the solid-systems and photonics (D-ESSP)
- Sciences laboratory of engineering
- Computing and imaging (ICube)
- And Laboratory physical and electronic spectroscopy (LPSE, Mulhouse)

Internship

Being introduced to a research environment is a preliminary step towards a PhD. In semester 4, a full-time laboratory training of at least 3 months will allow tstudents to test their ability to ability to integrate a research team, to get familiar with current research topics, write a report on the performed research of the performed research and evaluate their degree of autonomy. The topic can be chosen among proposals from local laboratories, as well as from French and international laboratories, as well as research and development (R&D) companies.

Career opportunities

Functions

- Researcher
- University professor
- Research engineer (after a PhD)

Relevant branches of activity

Basic or applied research

• Technology development and management of large technical projects in the public and private sectors, universities, CNRS, CEA, IRSN, EDF, ANDRA, AREVA, companies developing sensors, measurement systems and simulation tools.

Continuation of studies possible

In this Master (M2 level) from the third year at TPS, ensuring a double engineering and Master degree.

Key figure



success rate (over the last 4 years)

Contacts

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Admission and applications

Entry level

M1

 → Bachelor degree or equivalent (French or foreign "licence") in physics or applied physics.
RAdmission : candidature via monmaster.gouv.fr

M2

 \rightarrow The direct admission to the M2 level is possible for students with strong academic records that have the M1 level.

➡ Admission : ecandidat.unistra.fr or Campus France

