Le Mans Université - Faculty of Science & Technology

BACHELOR

Physics

(Physics-Chemistry major)

Faculté des Sciences & Techniques

Le Mans Université

How does the Licence work?

The Bachelor's degree is open to students holding a Baccalauréat (physics-chemistry and mathematics specialties recommended), or, after examination by a validation commission, to holders of any other French or foreign diploma of equivalent or higher level. Registration details are available on the University website and from the Registrar's Office.

The Bachelor's degree is made up of 6 semesters organized into teaching units (UE), also known as modules. Each UE comprises lectures, tutorials and practical work. Each semester is validated by the awarding of 30 ECTS credits (European Credit Transfer System), with a bachelor's degree being awarded on the basis of 180 credits. A semester is obtained by capitalizing or offsetting the UEs that make it up (average >= 10/20). Passage to the following year is conditional on validation of both semesters. In certain cases of non-validation of a semester (in L1 and L2), and on the advice of the jury, repeat students may be authorized to take certain UEs of the following year in advance.

Training objectives

The aim of the Physics Bachelor's degree is to provide the theoretical and practical foundations needed for further study at Master's level (Bac+5), or even Doctorate level (Bac+8).

For students who cannot or do not wish to continue beyond the Licence level, the courses offered enable them to opt for a Licence Professionnelle (based on their applications) at the end of the second year.

At the end of L3, graduates have the following skills (among others):

- ✓ Mobilize the fundamental concepts of Physics ;
- ✓ Handle the main mathematical tools useful in physics ;
- ✓ Approaching and solving a complex problem by successive approximations ;
- ✓ Identify and independently carry out the various stages of an experimental approach;
- ✓ Use the most common laboratory measuring devices and techniques;
- ✓ Interpreting experimental data to envisage their modelling ;
- ✓ Using scientific computing tools and languages for Physics ;
- ✓ Validate a model by comparing its predictions with experimental results;
- ✓ Identify sources of error to calculate the uncertainty of an experimental result;
- ✓ Manipulating fundamental mechanisms on a microscopic scale ;
- ✓ Relate macroscopic phenomena to microscopic processes, etc.

Training organization

The course is divided into 6 semesters over 3 years:

S1 is a portal common to 2 fields (PC and Maths). It enables students to confirm or reject their choice of major. A change of major (to Maths or possibly to Life Sciences or Earth Sciences) is therefore possible at the end of S1.

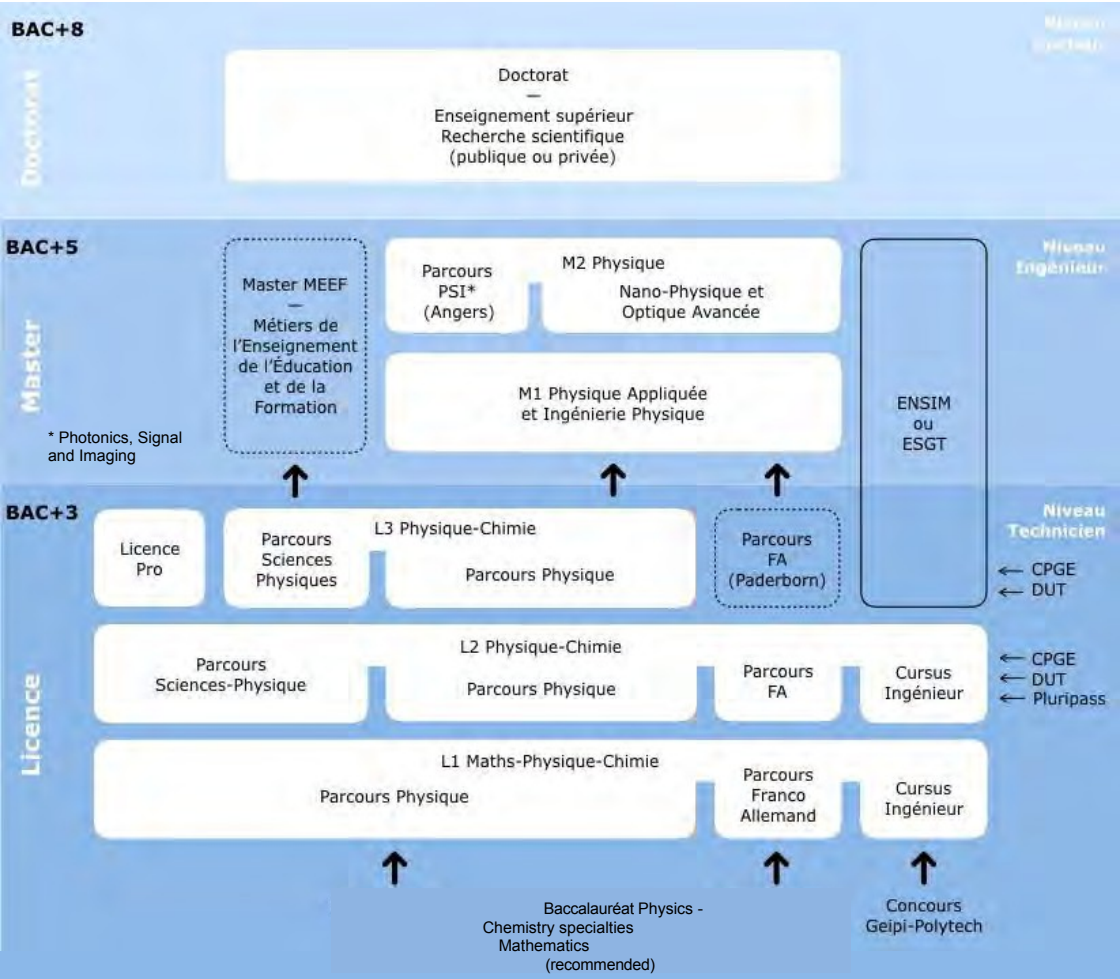
The first year is multidisciplinary. It provides the basic knowledge required by all scientists, whatever their future specialization, and enables them to gradually choose their field of study. To this end, students are helped by pre-professional modules that give them a vision of the different professional sectors they could move into, and a personal reflection on their future direction.

One of the special features of the Physics-Chemistry major is that it offers 3 pathways in L1 and L2: **Physics-Chemistry** (classic pathway), **Engineering** (with modules specific to the engineering schools on campus: ESGT, ENSIM, ISMANS) and **Franco-German** (with German modules and some physics courses in German). Then 4 L3 courses: **Physics** (leading to a Master's degree in Physics), **Chemistry** (leading to a Master's degree in Chemistry), **Physical Sciences** (leading to a Master's degree in MEEF*) and **Franco-German**. The L3 Franco-German course is taken at the University of Paderborn.

In addition, distance learning in L3, M1 and M2 (EAD in Physics and Chemistry courses) meets a variety of needs (returning to school, career development, internships, dual training, etc.).

* MEEF: Métiers de l'Enseignement, de l'Éducation et de la Formation, to prepare aCAPES in Physics and Chemistry.

General outline of the Physics program



Physics pathway

Common first year Physics-Chimistry

Semester 1

Module title	hours	ECTS
Mathematical calculations	45	6
Maths 1/Maths	231/18	3/2
Algorithms and programming	30	4
Structure and properties of atoms	23	3
Chemical reaction	31	3
Mechanical engineering	27	2
Optical	24	2
Writing to communicate	12	1
Project	10	2
English	20	2

Semester 2

Module title	hours	ECTS
Linear algebra	30	3
Algorithms and programming	30	2
Mechanical engineering	20	2
Electronics	15	2
Thermodynamics	18	2
Chemical bonding and stacking	30	3
Organic chemistry	26	3
Chemical equilibria in solution	30	3
Experimental physics	24	3
Digital skills (C2i)	15	1
Student Professional Project	10	2
Panorama of modern science	10	2
English	15	2

Second common year Physics-Chemistry

Semester 3

Module title	hours	ECTS
Integral Calculus	28	3
Electronics	18	2
Electrostatics and magnetostatics	25	2.5
Electromagnetism and waves	25	2.5
and relativity	30	3
Experimental physics	18	2
Simulations in the physical sciences	28	3
Solid state chemistry	28	3
Inorganic chemistry	28	3
Organic chemistry	28	3
Communication in French	14	2
Opening module	20	2
English	15	2

Semester 4

Module title	hours	ECTS
Mathematics for Physics	30	3
Particle physics	30	3
Fluid mechanics	30	3
Quantum mechanics		
Experimental physics	15	2
Optics	20	2
Thermodynamics	20	2
Thermochemistry-kinetics	28	3
Inorganic chemistry	28	3
Communication in French	20	2
Opening module	20	2
English	15	2

Third year

Semester 5

Module title	hours	ECTS
Analytical and quantum mechanics	40	5
Physical and geometrical optics	40	5
Experimental physics	39	5
Electromagnetic waves and interfaces	48	5
Digital physics	35	4
Physics of dielectric media	16	2
Professional integration and preparation for the internship search	20	2
English	15	2

Semester 6

Module title	hours	ECTS
Quantum mechanics and nuclear physics	40	5
Fourier optics, signal processing	30	4
Experimental physics	42	5
Statistical thermodynamics and transfers	40	5
Electronics	27	3
Symmetry and materials	18	2
Physics of continuous media: Applications to solids	18	2
Physics internship or tutored project on Professional Project		2

Application for a Master's degree in Physics

Preparatory cycle for engineers (E2i)

First year

Semester 1

Module title	hours	ECTS
Mathematical tools for sciences Linear algebra	52	6
Algorithms and programming	35	4
Structure and properties of atoms	30	4
Chemical reaction	23	3
Mechanical engineering	31	3
Optics	16	2
Experimental physics	18	2
Communication in French	20	2
English	10	2
	15	2

Semester 2

Module title	hours	ECTS
Analysis	60	6
Linear algebra	30	3
Descriptive statistics	30	3
Algorithms and programming	30	2
Mechanical engineering	20	2
Electronics	15	2
Thermodynamics	18	2
Experimental physics	24	3
Digital skills (C2i)	15	1
Student Professional Project	10	2
Panorama of modern science	10	2
English	15	2

Second year

Semester 3

Module title	hours	ECTS
Scientific computing	28	3
Integral calculation	28	3
Numerical series and probability	28	3
Algorithms and programming	55	6
Electronics	20	2
Electrostatics and magnetostatics	25	2,5
Electromagnetism and wavesPhysics	25	2,5
experimental Communication in French	18	2
Opening module	14	2
English	20	2
	15	2

Semester 4

Module title	hours	ECTS
Multi-variable function	28	3
Descriptive statistics and inferential	28	3
Experimental physics	15	2
Thermodynamics	20	2
Optics	20	2
Opening module	20	2
TOEIC preparation (English)	30	4
Modules for ESGT		
Land use and development	40	4
Geomatics	60	8
Modules for ENSIM		
Acoustic vibrations, sensors	50	6
IT	50	6

Integration into an engineering school

ESGT

ENSIM
École d'ingénieurs
Le Mans Université

Franco-German course

First year

Semester 1

Module title	hours	ECTS
Mathematical tools for sciences Linear algebra	52	6
Algorithms and programming	35	4
Structure and properties of atoms	30	4
Chemical reaction	23	3
Mechanical engineering	31	3
Optics	16	2
Experimental physics	18	2
English	20	2
German culture	15	1
German as a general language	24	1
German as a specialist language	15	1
	18	1

Semester 2

Module title	hours	ECTS
Linear algebra	30	3
Algorithms and programming	30	2
Mechanical engineering	20	2
Electronics	15	2
Thermodynamics	18	2
Chemical bonding and stacking	30	3
Organic chemistry	26	3
Experimental physics	24	3
Digital skills (C2i)	15	1
Student Professional Project	10	2
English	15	2
German science culture	24	2
German as a general language	15	1
German as a specialist language	24	2

Second year

Semester 3

Module title	hours	ECTS
Integral calculation	28	3
Electronics	18	2
Electrostatics and magnetostatics	25	2,5
Electromagnetism and waves	25	2,5
Quantum mechanics	24	3
Experimental physics	18	2
Simulations in the physical sciences	28	3
Signal processing	45	4
English	15	2
German science culture	24	2
German as a general language	15	2
German as a specialist language	18	2

Semester 4

Module title	hours	ECTS
Atomic and molecular physics	24	3
Thermodynamics	20	2
Optics	20	2
Experimental physics	15	2
Quantum mechanics and relativity (or interns hip)	30	3
English	15	2,5
German science culture	24	3
German as a general language	15	2
German as a specialist language	24	3
Tandem Project		1,5
A choice of two modules		
Material characterization	28	3
Physico-chemical methods	28	3
Particle physics	30	3
Fluid mechanics	30	3

Third year at the University of Paderborn, Germany

PADERBORN UNIVERSITY

How do I register?

1 - January: 10 applications entered on the "Parcoursup" website www.parcoursup.fr
2 - End of May: affichage of admission proposals and choice of candidates.
3 - July: register as soon as you have obtained your baccalaureate results, according to the procedures on the "Parcoursup" website and/or on the Le Mans Université website: www.univ-lemans.fr section FORMATION > CANDIDATURES / INSCRIPTIONS

Registration fee :

As an indication, the registration fee for the 2019-2020 academic year is €170.
payable after payment of the €90 CVEC. Go to cvec.etudiant.gouv.fr

Scholarship holders are exempt from paying the CVEC and registration fees. Students who have received a conditional grant are automatically detected on the site and can download their CVEC payment certificate at the end of the online procedure.

Please note: a DSE (dossier de bourse et logement) must be completed for the start of the new school year in September.
is to be completed from mid-January on the CROUS website: www.crous-nantes.fr/bourses/

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