BACHELOR OF SCIENCE IN FUNDAMENTAL PHYSICS

General Program Description:

The Bachelor of Science in Fundamental Physics is part of the Science of Matter domain and focuses on providing students with an in-depth understanding of classical and modern physics. This program combines theoretical foundations, mathematical tools, and practical laboratory skills essential for scientific analysis and problem-solving in physics.

It prepares students for advanced studies (Master's and Ph.D.) as well as for employment in teaching, research, and technical roles in various sectors like education, industry, and technology.

Program Objectives and Competencies:

Develop strong knowledge in classical mechanics, thermodynamics, electromagnetism, quantum physics, and statistical mechanics.

Train students in mathematical methods, programming, and experimental techniques.

Foster critical thinking, scientific writing, and presentation skills.

Prepare students for roles in research labs, technical industries, and academic institutions.

Admission Requirements:

Eligibility:

High school diploma (Baccalaureate) in Science (Mathematics or Experimental Sciences track).

Strong performance in mathematics and physics.

Admission Procedure:

National academic application.

Evaluation based on academic records, especially in science subjects.

Key Program Structure:

Duration: 3 years (6 semesters)

Credits: 180 ECTS

Course Types:

Fundamental Units (UEF) – core scientific subjects.

Methodological Units (UEM) – lab work and technical training.

Discovery Units (UED) – interdisciplinary and general knowledge.

Transversal Units (UET) – language and communication skills.

Core Subjects (Examples):

Year 1 (Semesters 1 & 2):

Mathematics 1 & 2: Analysis, Algebra, Differential Equations

Physics 1 & 2: Mechanics, Electricity, Electromagnetism

Chemistry 1 & 2: Atomic Structure, Thermodynamics, Chemical Kinetics

Computer Science: Office Tools, Programming (Fortran, MATLAB)

Laboratory Work: Mechanics, Electricity, Chemistry

Discovery Courses: Environment, Biotechnology, Renewable Energies

Foreign Languages: English or French (Scientific Language)

Year 2 (Semesters 3 & 4):

Analytical Mechanics

Vibrations and Waves

Geometric and Physical Optics

Quantum Mechanics

Thermodynamics

Complex Variables

Fluid Mechanics

Electronics

Numerical Methods & Programming

Specialized Subjects (Year 3 – Semesters 5 & 6):

Semester 5:

Quantum Mechanics II

Statistical Physics

Special Relativity

Mathematical Methods for Physics

Electromagnetic Waves or Semiconductor Physics

Digital Physics or Data Analysis

Scientific English

Elective: Biophysics, Particle Physics, Acoustics, etc.

Semester 6:

Solid State Physics

Nuclear Physics

Heat Transfer

Atomic Physics

Nuclear or Atomic Physics Lab

Solid State or Optical Physics Lab

Elective: Lasers, Plasma Physics, Nanotechnology, Photovoltaics, New Materials

Ethics and Professional Conduct

Scientific English II

Career Opportunities:

Graduates may pursue:

Technical and Research roles in public/private labs

Teaching positions in secondary education

Employment in industries related to energy, materials, and electronics

Further studies in Master's or Doctoral programs in Physics, Engineering, or Applied Sciences

Language in which the training is provided:

The Fundamental Physics bachelor's degree is predominantly taught in French; however, in recent years, certain subjects or parts of them have been offered in English.