Bachelor of Science in Physics (4 Years, 240 ECTS)

A hands-on physics degree that blends deep theoretical understanding with extensive laboratory and computational practice across classical, quantum, and modern physics.

Program Overview

- **Award:** B.Sc. in Physics
- **Duration:** 8 Semesters (4 academic years)
- **Total Credits:** 240 ECTS
- **Delivery:** Lectures (L), Tutorials (T), Laboratories (P), Computing Labs (CL), Field/Observatory Work (F)
- **Workload:** 1 ECTS ≈ 25–30 hours
- **Program Pillars:** Classical Mechanics • Electromagnetism • Quantum Physics • Thermal & Statistical Physics • Optics & Photonics • Computational Physics • Electronics & Instrumentation • Modern Physics & Materials • Research Methods • Safety & Ethics
- **Signature Experiences:** advanced instrumentation labs, optional observatory nights, and a summer research internship.

Graduate Learning Outcomes

Graduates will be able to:

1. **Physical Principles.** Apply classical and modern physics principles to analyze complex physical systems.
2. **Experimental Skills.** Design experiments, operate instrumentation, and perform careful uncertainty and error analysis.
3. **Computation.** Model physical phenomena using numerical methods, simulation, and scientific programming.
4. **Mathematical Methods.** Use differential equations, linear algebra, and transforms to solve physics problems.
5. **Research Design.** Formulate hypotheses, plan investigations, and interpret results with scientific rigor.

6 **Communication.** Present technical findings clearly through lab reports, posters, and oral presentations.

7 **Professional Practice.** Work safely in labs, collaborate effectively, and follow ethical research conduct.

8 **Applications.** Connect physics to technologies in energy, materials, sensing, computing, and space.

Curriculum Structure

Structured across 8 semesters (30 ECTS each). Most courses are 6 ECTS unless otherwise noted.

Year 1

Semester 1 (30 ECTS)

- Calculus for Physicists I - 6 ECTS
- Physics I (Mechanics) - 6 ECTS
- General Chemistry for Physicists - 6 ECTS
- Intro Physics Laboratory & Measurement - 6 ECTS
- Scientific Writing & Communication - 6 ECTS

Semester 2 (30 ECTS)

- Calculus for Physicists II - 6 ECTS
- Physics II (Electricity & Magnetism) - 6 ECTS
- Linear Algebra & Vector Calculus - 6 ECTS
- Electronics Fundamentals Laboratory - 6 ECTS
- Physics Ethics & Lab Safety - 6 ECTS

Year 2

Semester 3 (30 ECTS)

- Classical Mechanics II (Lagrangian & Hamiltonian) - 6 ECTS
- Electromagnetism I (Fields) - 6 ECTS
- Mathematical Methods for Physics - 6 ECTS
- Modern Physics Laboratory (Optics & Spectra) - 6 ECTS
- Technical Elective I - 6 ECTS

Semester 4 (30 ECTS)

- Quantum Physics I - 6 ECTS
- Thermal Physics I - 6 ECTS
- Electromagnetism II (Waves) - 6 ECTS
- Computational Physics I (Numerical Simulation) - 6 ECTS
- Technical Elective II - 6 ECTS

Year 3

Semester 5 (30 ECTS)

- Quantum Physics II - 6 ECTS
- Statistical Physics - 6 ECTS
- Optics & Photonics - 6 ECTS
- Advanced Physics Laboratory (Instrumentation) - 6 ECTS
- Technical Elective III - 6 ECTS

Semester 6 (30 ECTS)

- Solid State & Materials Physics - 6 ECTS
- Computational Physics II (Data & Modeling) - 6 ECTS
- Nuclear & Particle Physics - 6 ECTS
- Technical Elective IV - 6 ECTS
- Summer Research Internship - 6 ECTS

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Year 4

Semester 7 (30 ECTS)	• Advanced Electrodynamics - 6 ECTS • Quantum Mechanics (Advanced Topics) - 6 ECTS • Experimental Methods & Scientific Computing - 6 ECTS • Technical Elective V - 6 ECTS • Capstone Research I (Proposal & Setup) - 6 ECTS
Semester 8 (30 ECTS)	• Capstone Research II (Experiment/Simulation & Thesis) - 12 ECTS • Astrophysics & Cosmology - 6 ECTS • Physics in Industry Seminar - 6 ECTS • Advanced Seminar & Presentation - 6 ECTS

Technical Elective Tracks

Choose at least 5 electives; focus on one track for specialization.

Track A — Astrophysics & Space

- Stellar Structure
- Relativity
- Observational Astronomy
- Space Mission Data Analysis

Track B — Photonics & Quantum Tech

- Laser Physics
- Quantum Information
- Nanophotonics
- Quantum Sensing

Track C — Materials & Condensed Matter

- Semiconductor Physics
- Magnetism

- Thin Films
- X-ray & Neutron Scattering

Track D — Computational & Data Physics

- High-Performance Computing
- Monte Carlo Methods
- Scientific Machine Learning
- Inverse Problems

Laboratories & Facilities

Teaching Laboratories

Modern labs for mechanics, E&M;, optics, and thermal experiments with calibrated sensors and data acquisition.

Electronics & Instrumentation

Oscilloscopes, function generators, PCB prototyping, and microcontroller-based measurement systems.

Computational Cluster Access

GPU and CPU resources for simulation, HPC assignments, and capstone-scale computation.

Observatory & Remote Telescopes

Small on-campus observatory plus access to partner remote telescope networks for student projects.

Capstone Research Examples

- **Exoplanet Transit Detection**
  Process photometry data to detect transit signals and estimate orbital parameters.
- **Magnetic Materials Characterization**
  Measure hysteresis curves and relate microstructure to macroscopic magnetic behavior.
- **Quantum Well Simulation**
  Model bound states and tunneling using finite-difference or spectral methods.
- **Low-Cost Environmental Sensor Network**
  Design and calibrate a sensor node, then analyze spatiotemporal data.