National University of Science and Technology
POLITEHNICA Bucharest
Faculty of Applied Sciences

Bachelor's Program in Physical Engineering

Description

Technological innovation increasingly relies on the application of fundamental physics to solve complex engineering challenges. From advanced materials and photonics to renewable energy, quantum technologies, semiconductor devices, and medical instrumentation, modern industries require engineers with a deep understanding of physical principles and the ability to translate scientific knowledge into technological solutions.

The **Bachelor's Program in Physical Engineering** provides students with a comprehensive education that combines physics, mathematics, computer science, and engineering sciences. The program develops a strong theoretical foundation while emphasizing practical problem-solving, experimental techniques, computational modeling, and modern engineering applications.

Students acquire advanced knowledge of mechanics, electromagnetism, thermodynamics, optics, quantum physics, materials science, electronics, and computational methods. Through laboratory work, engineering projects, and research-oriented activities, they learn to design, analyze, and optimize physical systems used in cutting-edge technologies across multiple industrial sectors.

Why Choose This Program?

Physical Engineering offers a unique interdisciplinary education that bridges fundamental science and engineering practice. Graduates develop the analytical thinking, experimental skills, and computational expertise required to address technological challenges in rapidly evolving scientific and industrial environments.

The program emphasizes both theoretical understanding and hands-on experience, enabling students to work confidently in multidisciplinary teams and to contribute to innovation in high-technology industries and research laboratories.

Competencies Acquired

Upon graduation, students will be able to:

- Apply the principles of classical and modern physics to engineering problems.
- Develop mathematical and computational models of physical systems.

- Design, conduct, and interpret scientific and engineering experiments.
- Utilize advanced laboratory instrumentation and measurement techniques.
- Analyze and optimize electronic, optical, thermal, and mechanical systems.
- Apply numerical methods and scientific computing to engineering applications.
- Integrate sensors, instrumentation, and data acquisition systems into experimental and industrial environments.
- Evaluate the performance and reliability of technological systems using analytical and experimental methods.
- Communicate technical results effectively and work efficiently within multidisciplinary engineering teams.

Curriculum Highlights

The curriculum includes courses in:

- Mathematical Analysis
- Linear Algebra and Differential Equations
- Classical Mechanics
- Electromagnetism
- Thermodynamics and Statistical Physics
- Optics and Photonics
- Quantum Physics
- Atomic and Nuclear Physics
- Solid-State Physics and Materials Science
- Electronics and Instrumentation
- Numerical Methods and Scientific Computing
- Programming for Engineering Applications
- Measurement Techniques and Sensors
- Engineering Design and Simulation

Practical Training

The program places strong emphasis on experimental learning through:

- Modern physics and engineering laboratories
- Computational modeling and numerical simulation
- Engineering design projects
- Research internships

- Industrial placements with technology companies and research institutes
- Undergraduate research opportunities alongside academic staff

Students gain practical experience using professional laboratory equipment and computational tools commonly employed in engineering and scientific research.

Career Opportunities

Graduates possess a versatile combination of scientific knowledge and engineering skills, opening career opportunities in diverse technological sectors, including:

- High-Tech Manufacturing
- Electronics and Semiconductor Industry
- Photonics and Optical Engineering
- Energy Systems and Renewable Technologies
- Aerospace and Automotive Engineering
- Medical Devices and Biomedical Engineering
- Scientific Instrumentation
- Industrial Research and Development
- Materials Engineering
- Data Acquisition and Measurement Systems
- Scientific Computing
- National and International Research Laboratories

The program also provides an excellent foundation for graduate studies in physical engineering, applied physics, materials science, photonics, nuclear engineering, renewable energy, computational engineering, and related disciplines.

Program Highlights

- Interdisciplinary curriculum integrating physics, engineering, mathematics, and computing.
- Strong emphasis on laboratory work, experimentation, and computational modeling.
- Modern engineering applications in photonics, electronics, materials, and energy technologies.
- Close interaction with experienced faculty actively involved in national and international research projects.

- Excellent preparation for careers in advanced technology industries, research institutes, and engineering companies.
- Strong foundation for continuing studies at the master's and doctoral levels.

Additional Information

- **Language of instruction:** Romanian
- **Duration:** 4 years (240 ECTS)
- **Degree awarded:** Bachelor of Science (B.Sc.) in Applied Engineering Sciences