Politecnico di Torino

ACADEMIC REGULATIONS

Bachelor's degree programme
in
PHYSICAL ENGINEERING

Department of Electronics and Telecommunications
Collegio di Ingegneria Elettronica, delle Telecomunicazioni e Fisica

Academic Year **2026/2027**

The English translation of this document is provided as a support to the student community and has no legal effects.
The Italian version shall constitute the sole authentic text and will be referred to for any legal matter.

SUMMARY

Art. 1 - Specific learning objectives and career prospects

1.1 Specific Learning Objectives

The Bachelor's degree programme in Physical Engineering aims to train professionals who combine the approaches and methods of both engineers and physicists, capable of working with speed and expertise in the most advanced and evolving sectors of applied physics, and of actively contributing to technological development. This development is increasingly characterised by the shortening of the time between scientific discovery and its application, as well as by a high degree of innovation.
In this respect, the degree programme responds to a specific need of industries that rely heavily on the development and production of devices and systems for advanced technological applications. At the international level, the professional profile of the Physical Engineer is part of the educational offerings of leading technological universities.
The programme provides the cultural and technical foundations—mathematical, physical, and engineering—required to carry out research and development activities in the fields of Information and Communication Technologies (ICT), nanostructures, nano systems and nanodevices, as well as in the analysis and management of complex physical, biological, and social systems. It prepares graduates to enter the job market directly, especially in high-tech industries, research centres, and hospitals, where the technical skills acquired in the first-cycle degree can be effectively applied in technological and operational roles.
At the same time, the programme offers students a strong foundation to continue their studies in a Master's degree programme, with several options available at Politecnico di Torino—primarily the Master's degree programme in Nanotechnologies for ICT and the Master's degree programme in Physics of Complex Systems.

1.2 Career prospects

The Bachelor's degree programme aims to train a variety of professional profiles. The career prospects and main functions and competencies associated to each profile are illustrated below.

Professional Profile	Main functions and competencies
Designer of Advanced Technology Devices	Functions: They contribute to the design and optimisation of advanced technology devices for electronic circuits, starting from specifications and performing the selection of active and passive components, the design of the circuit board and its layout, and finally the final testing. Depending on requirements, a designer of advanced technology devices typically designs sensors and actuators whose functionality relies on quantum physics effects in electron systems, including those confined at the nanometre scale. Their design tasks also include miniaturised devices for applications in micro- and nanotechnologies applied to ICT. This professional role is also responsible for contributing to the integration of the designed devices into systems for the collection and processing of data and signals generated by sources of very low intensity, such as biological systems, as well as for information storage, processing, and transfer. Competencies: • develop and optimise materials for advanced technology devices based on quantum physics phenomena of matter • develop and optimise functional materials and nanomaterials for modern advanced devices in ICT • prepare and characterise innovative materials for advanced technology devices from a physical perspective • design simple electronic circuits including electronic and microelectronic devices • work in teams operating in the field of microelectronic technologies and microsystems • use radiofrequency devices, sensors, and actuators to design complex multifunctional devices Potential employers: • high-tech industries • public and private research centres

	• university laboratories
Operator and Maintenance Technician of Devices Based on Advanced Physical Phenomena	Functions: They are responsible for operating complex systems and apparatus used for the production and characterisation of innovative materials, for the collection and analysis of signals and information from biological and environmental sources, and for activities related to the diagnosis and treatment of diseases. In particular, they operate advanced technology systems such as lasers for industrial and metrological applications, photonics systems, high-vacuum systems, nanomaterials technology systems, and diagnostic and therapeutic systems for medicine. Their tasks also include setup, functionalisation, testing, maintenance, and upkeep of such systems and equipment. Competencies: • operate and manage industrial or biomedical apparatus based on advanced technologies, and optimise their performance • operate and manage vacuum production systems and cryogenic equipment • maintain the functionality of apparatus and measurement systems based on innovative materials for advanced technologies • operate and manage apparatus based on advanced techniques (nuclear and condensed matter physics) for biomedical applications Potential employers: • high-tech industries • environmental protection agencies • hospitals and local healthcare organisations • university laboratories
Scientific Consultant in Service Companies for Industry	Functions: They contribute to the transfer of innovation to applications in all industrial sectors that make use of physical and optical technologies, also by providing consultancy services to companies or organisations engaged in promoting and disseminating technological innovation within the production sector. They advise on the adoption of new technologies in industrial processes, being able to assess the applicability of a new technique or class of innovative materials. They also contribute, as innovation specialists, to drafting cost–benefit analyses related to the adoption of new technologies. Competencies: • assess and propose the most suitable innovative technologies for specific industrial processes • recommend the adoption of innovative techniques for the measurement of physical quantities of practical interest • identify the most appropriate solutions for the development of devices based on innovative materials Potential employers • scientific and technological consulting firms
Preparation for further studies	**Knowledge required for further studies**
The Bachelor's degree in Physical Engineering primarily prepares students for the following three Master's degree programmes offered at Politecnico di Torino: • **Nanotechnologies for ICT** • **Physics of Complex Systems** • **Quantum Engineering**	The curriculum covers: • basic and intermediate Mathematics • basic Chemistry • basic Computer Science • basic Electrical Engineering • basic Physics • applied and advanced Physics (Quantum Mechanics, Solid-State Physics, Nuclear Physics) • Materials Physics for applications in ICT and nanotechnologies

	• basic and intermediate Electronics (devices, circuits, fields) This educational pathway, which combines the development of concepts and tools related to advanced Physics phenomena and topics with the fundamental skills of modern Information Engineering, is designed to efficiently meet the prerequisites required for the three Master's degree programmes listed above. Training in Physical Engineering can also be applied for enrolment in other Master's degree programmes of the ETF College, potentially with appropriate modifications to the study plan, in accordance with the procedures established by the College regulations.

1.3 Professional profiles (ISTAT codes)

With reference to the list of professional profiles classified by ISTAT (Italian National Institute of Statistics, https://www.istat.it/en/), a graduate from this Bachelor's degree programme can work as:

ISTAT code	Description
3.1.1.1.2	Tecnici fisici e nucleari
3.1.3.4.0	Tecnici elettronici

Art. 2 - Admission requirements

To be admitted to this Bachelor's degree programme, applicants must hold a high school diploma (as required by current regulations) or an equivalent qualification obtained abroad, recognized as valid. Additionally, they must have or attain an appropriate level of initial background knowledge.

The number of admissible students is determined annually by the Governing Bodies of Politecnico based on locally programmed admissions, considering the available facilities and the student-to-faculty ratio.

The number of available places and admission procedures are specified in the official Call for applications for admissions published at https://www.polito.it/en/education/applying-studying-graduating/admissions-and-enrolment/bachelor-s-degree-programmes/calls-for-application-regulations-and-ranking-lists .

In particular, for enrolment in this Bachelor's degree programme, applicants must take an admission test (TIL-I), administered in different sessions according to a specific calendar published on the recruitment web pages.

The test is conducted using the technical equipment available in the computer laboratories of the University.

The minimum score required to be included in the ranking list is set at 30% of the total score. Applicants may take the TIL-I test up to a maximum of three times. In the event of multiple attempts, the highest score obtained by the applicant will be considered valid. The test consists of answering 42 questions in 1 hour and 30 minutes. These questions are divided into four sections covering four different subject areas: Mathematics, Reading Comprehension and Logical Reasoning, Physics, and Basic Technical Knowledge.

Applicants who score below 30% in the Mathematics section will have to fulfil some supplementary academic obligations (in Italian, Obblighi Formativi Aggiuntivi - OFA).

They will be invited to attend tutoring math classes during Year 1 and they must attend a supplementary course. This course, called C.I.A.O. - Corso Interattivo di Accompagnamento Online (Interactive Online Support Course), is normally offered in the week before the beginning of classes. It seeks to help applicants fill in the gaps in their Math knowledge through specific online tutoring sessions.

The OFA requirements will be considered fulfilled if, by the end of Year 1, at least one of the following conditions is met:

- students pass one of the two Mathematics exams of Year 1 (Mathematical Analysis I or Linear Algebra and Geometry);
- students pass the final test of the CIAO course by correctly answering at least 10 out of 15 questions. This test will be offered five times during the academic year.

Any exemptions from taking the admission test are specified in the Call for applications for admissions to the Bachelor's degree programmes of Politecnico di Torino.

Students with a non-Italian educational qualification who intend to enrol in the programme, which is delivered entirely in Italian, must hold, at the time of enrolment, a certificate of Italian language proficiency at level B2, as defined by the Common European Framework of Reference for Languages (CEFR).

For more information regarding the Call for applications, the number of admissions, the admission test registration and enrolment procedures, please visit https://www.polito.it/en/education/applying-studying-graduating/admissions-and-enrolment/bachelor-s-degree-programmes/calls-for-application-regulations-and-ranking-lists .

Art. 3 - Programme curriculum

3.1 Programme overview

The study programme does not include any Specialist Track and is organised into interconnected thematic areas.

Students will take courses designed to develop:

- the fundamental skills essential for the training of an Engineer, including scientific foundations and the methodological and operational aspects of Mathematics and basic sciences (Physics, Chemistry, Computer Science) as applied to Engineering. These courses are offered in the first year and in the first half of the second year. The relevant learning areas, as described in the following Table A4b, are: "Mathematics, Computer Science and Statistics" and "Basic Physics and Chemistry."
- the core engineering skills necessary to define the professional profile of an Engineer working in the Information area, with specific reference to Electrical Engineering, Electronics, Electromagnetic Fields, and Measurements. These courses are offered in the second and third years. The relevant learning areas, as described in Table A4b, are: "Electrical Engineering" and "Electronic Engineering."
- advanced and applied Physics skills essential to define the professional profile of the Physical Engineer, covering Quantum Mechanics, Statistical Physics, Complex Systems Physics, Solid-State Physics, Nuclear Physics, and their applications in materials and innovative devices. These courses are primarily offered in the third year, allowing students to fully and synergistically apply the contents and methodological and operational tools provided by the scientific and engineering core courses. The relevant learning area, as described in Table A4b, is "Advanced and Applied Physics."

In this way, students receive a balanced education in basic sciences and methodologies, Information Engineering, and advanced and applied Physics, providing a set of skills and abilities consistent with professional destinations.

Students also have the opportunity to select additional courses from the University's course catalogue to complete and deepen their training, both in Economics and Humanities, and in emerging topics related to Information Engineering or other engineering sectors. They may also choose, using part or all of the elective credits, to undertake an internship in a company on topics consistent with their study plan, under the supervision of both an academic tutor and a company tutor.

The curriculum is completed with credits dedicated to basic language training and the final examination.

At the end of the degree programme, students will be able to operate advanced technology devices and apparatus based on innovative physical phenomena (for example, devices for micro- and nanotechnologies and microelectronics, devices for telecommunications, and devices for data and information recording).

Courses in this programme may also be attended in English during the first two years, benefiting from integration into the multicultural environment composed of the many native English-speaking students enrolled at Politecnico di Torino.

3.2 Organization of educational activities

The list of courses (compulsory and optional), curricula, possible organization of courses into modules, any pre-requisites and exclusions and the list of the faculty members responsible for the courses are available at: https://didattica.polito.it/pls/portal30/sviluppo.offerta_formativa_2019.vis?p_coorte=2027&p_sdu=37&p_cds=555

The list of the Scientific Disciplinary Fields (Settori Scientifico Disciplinari) for each activity (specific subjects and complementary subjects) is available in Annex 1 to the present Regulations.

Art. 4 - Student career

The Student Guide is published on the Teaching Portal every year before the beginning of the academic year. There is a specific Student Guide for each Bachelor's degree programme. The Student Guide is available on the web site of the degree programme.

It contains information and deadlines on:

- academic calendar;
- supplementary academic obligations (Obblighi Formativi Aggiuntivi - OFA);
- Personal Study Plan and Annual Personal Study Plan;
- free choice credits;
- internships;
- tuition fees;
- dual career;
- classes and exams;
- class delivery;
- foreign language learning;
- studying abroad/mobility programmes;
- exam rules;
- transfers in/out and internal transfers;
- interruption, suspension, withdrawal, forfeiture;
- credit transfer.

Art. 5 – Final Examination

The final examination consists of the preparation of an independently written report (Final Project).

It is worth 3 credits and involves in-depth study, analysis, development, or applications of topics covered in the degree programme, or of other subjects consistent with its educational objectives.

The purpose of the final examination is to assess students' ability to integrate the knowledge acquired in various courses through the in-depth exploration of interdisciplinary laboratory experiences, resulting in a technical report.

The content of the Final Project must demonstrate that the student has acquired adequate knowledge of the scientific literature (national and/or international) on the chosen topic. Furthermore, in developing the assigned topic, the student must demonstrate mastery of the analytical methods and approaches required for preparing the report and show the ability to critically draw well-argued conclusions from the evidence presented. The Final Project may be written in Italian or English.

The final examination also aims to develop the student's ability to apply knowledge and understanding in producing a coherent and comprehensive synthesis of a research topic in which they have participated in an operational role, and to communicate significant scientific information on a specific topic verbally within a defined time frame, including through the use of presentation software.

The execution of the Final Project must be agreed upon with the course instructor of the relevant course for the final examination (currently "Nanoscience Technology"). During the in-depth study, the student may receive supervision from a tutor experienced in the chosen topic. The mode of presentation of the Final Project report may be agreed upon with the tutor and the course instructor and may consist of either an individual written report or a brief oral presentation supported by slides. Students generally have until the examination session in which they intend to take the relevant course exam to submit this report.

The total workload for the Final Project is approximately 75 hours. No public defence is required.

Students must submit their request online through the dedicated procedure available in their personal page on the Teaching Portal, in the section "Degree and Final Examination", complying with the deadlines for the relevant session published in the Student Guide – Thematic Calendar section.

The final grade is determined by the Graduation Examining Committee, which evaluates the overall average grade of the exams on a scale of 110 after having subtracted the 16 worst credits. This number is proportionally reduced if some of the exams have been validated without a grade (pass-or-fail exams) or in the event of credit transfer, since only the exams taken at Politecnico are taken into consideration for this calculation.

To this average, the committee may normally add up to 5 additional points, based on:

- the number of years it took the student to complete his/her studies;
- the evaluation of the educational path partially or totally in English;
- other information about the student's course of study (for instance, the number of exams passed with honours, experience abroad, extracurricular activities etc.).

Starting from 2022/23 cohort (students with first enrolment at Politecnico starting from a.y. 2022/2023):

You may get a 0.5 points bonus that will be added to your final examination score (final grade) for:

- each Year 1 exam that you will pass on time (excluding the English language exam);
- for each core exam offered in the first semester of Year 2 that you will pass on time.

You will get this bonus if you pass:

- your Year 1 exams delivered in first semester: by the end of the Winter examination session of your year of first enrolment (Year 1)
- your Year 1 exams delivered in second semester: by the end of the Summer examination session of your year of first

enrolment (Year 1)
- your Year 2 core exams delivered in first semester: by the end of the Winter examination session of your second year of enrolment (Year 2).

This bonus (max 4 points) can be earned exclusively by the students who enrol for the first time in the university system (i.e. students who have never studied at any university before). Please note that forfeited students, withdrawn students, credit transfer students cannot get this bonus.

Please check the Student Guide to find out about the last examination session for passing your exams and getting the bonus.

Honours (cum laude) may be awarded upon achieving a score of 110.51, at the discretion of the committee and with a qualified majority, i.e., at least 2/3 of the committee members.

The Committees must express their evaluations by considering the student's entire academic records, assessing their cultural maturity and ability to develop independent intellectual work.

More Information and Deadlines:
- Student Regulations
- Student Guide

Diploma Supplement:
In compliance with article 11, paragraph 8, of Ministerial Decrees No. 509/1999 and 270/2004. Politecnico di Torino issues the Diploma Supplement, a document that can be attached to a higher education qualification. It is designed to improve the transparency of international qualifications, as it provides the description of the curriculum successfully completed by the student. This certificate follows the European model developed by the European Commission, the Council of Europe and UNESCO – CEPES: it is issued in two languages (Italian-English) and it is composed of approximately 10 pages.

More information at: https://www.polito.it/en/education/applying-studying-graduating/academic-experience/certificates-and-other-documents

Art. 6 - References

6.1 Student Regulations

The Student Regulations define the rights and responsibilities of students and set out the administrative and disciplinary rules that all students enrolled in a degree programme or in a single learning activity at Politecnico must abide by.

6.2 Other Regulations

Particular aspects of students' academic progress are governed by specific Regulations or Calls for Applications published on its website.
In particular:

- The Tuition Fee Regulations specify the annual tuition fees that students must pay. The procedure for requesting a tuition fee reduction is explained in a dedicated guide.
- The University Regulations on Funds for Student Mobility Abroad outline the principles and rules for awarding and disbursing mobility grants. Standard procedures apply to all types of mobility programmes with unified Calls for Applications published twice a year at https://www.polito.it/en/education/applying-studying-graduating/studying-abroad
- The Code of Ethical Conduct also applies to students.

Annex 1 - Tabella delle Attività Formative

Attività	Ambito Disciplinare	Settore	SSD corrisp	cfu min	cfu max
Attività di base	Fisica e chimica	CHEM-06/A - Fondamenti chimici delle tecnologie	CHIM/07	28	48
		PHYS-01/A - Fisica sperimentale delle interazioni fondamentali e applicazioni	FIS/01		
		PHYS-03/A - Fisica sperimentale della materia e applicazioni	FIS/01 - FIS/03		
		PHYS-04/A - Fisica teorica della materia, modelli, metodi matematici e applicazioni	FIS/03		
	Matematica, informatica e statistica	MATH-02/B - Geometria	MAT/03	28	48
		MATH-03/A - Analisi matematica	MAT/05		
		MATH-03/B - Probabilità e statistica matematica	MAT/06		
		MATH-05/A - Analisi numerica	MAT/08		
Attività caratterizzanti	Ingegneria delle telecomunicazioni	IINF-02/A - Campi elettromagnetici	ING-INF/02	6	18
	Ingegneria elettronica	IINF-01/A - Elettronica	ING-INF/01	20	40
		IINF-02/A - Campi elettromagnetici	ING-INF/02		
		IMIS-01/B - Misure elettriche ed elettroniche	ING-INF/07		
	Ingegneria informatica	IINF-05/A - Sistemi di elaborazione delle informazioni	ING-INF/05	6	18
Attività affini	Attivita formative affini o integrative	CHEM-06/A - Fondamenti chimici delle tecnologie	CHIM/07	24	36
		IIET-01/A - Elettrotecnica	ING-IND/31		
		PHYS-01/A - Fisica sperimentale delle interazioni fondamentali e applicazioni	FIS/04		
		PHYS-02/A - Fisica teorica delle interazioni fondamentali, modelli, metodi matematici e applicazioni	FIS/02 - FIS/04		
		PHYS-04/A - Fisica teorica della materia, modelli, metodi matematici e applicazioni	FIS/02		
Altre attività	A scelta dello studente	-		12	12
	Per la conoscenza di almeno una lingua straniera	-		3	3
	Per la prova finale	-		3	3
	Abilita informatiche e telematiche	-		-	-
	Altre conoscenze utili per l'inserimento nel mondo del lavoro	-		-	-
	Tirocini formativi e di orientamento	-		-	-
	Ulteriori conoscenze linguistiche	-		-	-
	Per stages e tirocini presso imprese, enti pubblici o privati, ordini professionali	-		-	-