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Documentation for Quality Assurance of Study Programmes (DoQuP)

Example of Documentation for Quality Assurance of Study Programmes according to the DoQuP Model

Bachelor in Physics

Documentation File

March 2015

General Entry

Official Name of the Study Programme
Laurea in Fisica (Bachelor in Physics)

Qualification
Dottore in Fisica (Doctor in Physics)

Cycle /Level
Qualifications Framework for the European Higher Education Area (QF for EHEA): 1st cycle;
European Qualifications Framework for Lifelong Learning (EQF for LLL): level 6;
Italian Qualification Framework: 1st cycle.

Type of Degree & Length
Single degree (180 ECTS credits).

Institution(s)
DoQuP University, Italy.

Accreditation Organisation
National Agency for the Evaluation of the University System and Research (ANVUR).

Period of reference
Accredited for 3 years for cohorts commencing in academic year 2012/13.

Purpose
To provide education in Physics, envisaging various employment capabilities and careers. To prepare students with particular interest in specialized areas of Physics for further studies.

Discipline(s) / Subject area(s)
Physics; Mathematics; Informatics; Others (50: 30: 5: 15).

General / Specialist Focus
General education in experimental and theoretical Physics.

Orientation
Based on previous research and exposed to current research but introducing specializations envisaging specific employment/career opportunities: Physics (topics in theoretical and applied Physics), Biophysics, Medical Physics, Informatics.

Teaching & Learning Approaches
Lectures, laboratory classes, seminars, small group work, individual study based on text books and lecture notes, individual consultations with academic staff, preparing graduation-exam dissertation.

Assessment Methods
Written exams, oral exams, laboratory reports, oral presentations, continuing assessments, final comprehensive exam, assessment of graduation-exam dissertation.

Distinctive Features
The study programme (SP) is taught also in English.

Standard A - Needs and Objectives

The study programme should identify the educational needs of the labour market of reference, establish educational objectives coherent with the mission of the institution the study programme belongs to and the educational needs of the labour market of reference, and learning outcomes coherent with the established educational objectives.

Quality Requirement A1 - Educational needs of the labour market
The study programme should identify the educational needs of the labour market of reference.

The educational needs should be identified in terms of professional profiles and/or functions/roles/activities expected for the graduates and associated required competences.

Organisations consulted and Methods and schedule of consultation

For the identification of the general educational needs of the labour market in terms of required competences, the SP has made reference to the Tuning document "Reference Points for the Design and Delivery of Degree Programmes in Physics" (http://www.unideusto.org/tuningeu/images/stories/Publications/PHYSICS_FOR_WEBSITE.pdf) .

Furthermore the SP has appointed a University/Labour Market Committee, composed by representatives from University and from the labour market of reference, which meets at least once per year, with the main aim to adapt the general educational needs shared at international level with the expectations of the labour market of reference.

The representatives of the labour market of reference involved in the Committee are:

- representatives of the main industries located in the territory of reference (Liguria region), and in particular: Ansaldo Energy, …;
- representatives of the Chambers of Commerce of the Ligurian provinces;
- representatives of the Industry Associations of the Ligurian provinces;
- representatives of the Regional Association of Physicists.

Other informal, not scheduled ways of consultation are the relationships established with the industries where students carry out stages or develop their thesis work.

Another informal way of information on the needs and expectation of the labour market are the questionnaires filled by the graduates after 1÷3 years from their placement in the labour market.

Identified educational needs of the labour market

The identified educational needs and expectations of the labour market of reference are shown in the minutes of the last meeting of the University/Labour Market Committee held on 28 October 2012, available at http://www.physics.unidoqup.it/bachelorinphysics/communiversitylabourmarket/minutesmeeting28.10.2012.

In synthesis the graduates of the Bachelor in Physics are requested to have:

- a deep knowledge and understanding of the fundamental physics principles and of appropriate mathematical methods**;**
- ability to apply their knowledge and understanding in the analysis of both natural and technological physical phenomena;
- ability to solve a wide range of problems by identifying their fundamental aspects and using both theoretical and experimental methods;
- experimental and computational skills;
- learning ability to enter new fields by using mathematics and physics knowledge;
- team-work and time management;
- communication skills also with non-experts and using ICT;
- ethical commitment.

Quality Requirement A2 - Educational objectives

The study programme should define educational objectives in terms of professional profiles of the graduates and/or functions/roles/activities students are to be prepared for and associated key competences to be developed and obtained by the students during the learning process consistent with the mission of the institution the study programme belongs to and the educational needs of the labour market of reference.

Educational objectives

Professional profile

Physicist.

Functions/Roles/Activities students are to be prepared for

Research assistant in universities and research centres.
Laboratory technician in universities, research centres, industries.
Technical positions in microelectronics, telecommunication, opto-electronics, materials industries and societies.
Technical positions in informatics and software societies.
Technical positions in banks and insurance companies.

Key competences to be developed and obtained by the students during the learning process

Subject specific

- Mathematical skills: ability to understand and master the use of the mathematical and numerical methods most commonly used in physics.
- Deep knowledge and understanding: ability to analyse physical phenomena (both natural and technological) in terms of fundamental physics principles and knowledge and by means of appropriate mathematical methods.
- Physics culture: ability to provide explanations of a wide range of natural processes and objects (both natural and technological) ranging in scale from the universe as a whole (including its evolution from its origins to the present) to subatomic particles and processes. This ability to be grounded in a deep knowledge and understanding of a wide range of physics topics and theories.
- Problem solving: ability to solve a wide range of problems by identifying their fundamental aspects and using both theoretical and experimental methods as derived from physics curriculum.
- Estimation skills: ability to make order-of-magnitude estimates and find approximate solutions with explicit statements of assumptions and the use of special and limiting cases.
- Computational skills: ability to use appropriate software such as programming languages and packages in physics and mathematical investigations.
- Experimental skills: Ability to perform experiments independently, as well as to describe, analyze and critically evaluate experimental data.
- Learning ability**:** ability, through independent study, to enter new fields by using mathematics and physics knowledge.

Generic

- Analysis and synthesis: capacity for analysis and synthesis using logical arguments and proven facts.
- Flexible mind: acquisition of a flexible mind, open to apply basic physical knowledge and competences in a wide range of job opportunities and in everyday life.
- Team-work: capability to perform guided teamwork in a lab setting and related special skills demonstrating capacity for handling the rigor of the discipline and for time management (including meeting deadlines).
- Communication skills: ability to communicate effectively and to present complex information in a concise manner orally and in writing and using ICT and appropriate technical language.
- Popularization skills: ability to communicate with non-experts, including some teaching skills.
- Ethical commitment: ethical commitment from the point of view of both professional integrity and awareness of possible physics social impact.

Main areas in which graduates can find employment and level of responsibility they are qualified to take

Positions in companies/small enterprises and institutions (research, quality assurance, commerce)

from technological and informatics sector, bio-medical and pharmaceutical sector, environmental sector. Positions in financial institutions. Teaching positions.

Second cycle programmes in which the first cycle graduates can prosecute their studies
Master programmes in Physics (theoretical, applied physics), interdisciplinary programs related to Physics (Biophysics, Medical Physics, Geophysics), Master programmes in Engineering / Technological Physics or Informatics.

Quality Requirement A3 - Learning outcomes

The study programme should define learning outcomes in terms of what students are expected to know, understand and/or be able to demonstrate after completion of the educational process consistent with the national qualification framework, if any, and with the established educational objectives.

Learning outcomes

The learning outcomes expected in the students at the end of the educational process have been established as follows.

- Ability to demonstrate knowledge and understanding of mathematics relevant for physics at a basic level, i.e. differential and integral calculus, algebra, analytic functions of real and complex variables, vectors and matrices, vector calculus, ordinary and partial differential equations, statistics, Fourier methods and – furthermore – capability of using such tools in physics applications.
- Ability to demonstrate knowledge and understanding of physics fundamentals in: classical mechanics, vibrations and waves, optics and spectroscopy, thermodynamics, electromagnetism, quantum physics. The level of this knowledge of core physics is a basic one, i.e. the level needed for working with established areas of applications but not as high as is needed for research at the frontiers of knowledge.
- Ability to demonstrate experimental skills in physics (i.e. knowledge of experimental methods and how to perform physics experiments) under supervision, in order to test hypotheses and to investigate phenomena and their physical laws (i.e. being able to ask for the right questions; familiar with most common instrumentations; designing, assembling, conducting experiments; collecting and analyzing data, including careful error analysis and critical evaluation of experimental results).
- Ability to demonstrate knowledge and understanding at a basic level of elements of theoretical physics (analytical mechanics, classical electromagnetism, relativity, etc.; quantum theory; statistical mechanics) to appreciate the role of models and theories in the development of physics and to shape a flexible mind.
- Ability to demonstrate knowledge and understanding at a basic level of modern physics (atomic and molecular, nuclear and sub-nuclear, solid state, astrophysics) with some exposure to research frontiers.
- Ability to apply knowledge and understanding at an operational level of elements of applied physics and related subjects (chemistry, electronics et related) to foster awareness of interrelations among hard sciences.
- Basic knowledge and understanding of special fields chosen by the student: theoretical physics, photonics, polymers, condensed matter physics, biophysics, medical physics, informatics in order to prepare for future specialization and/or interdisciplinary approaches.
- Ability to perform computer calculations related to physics problems by using appropriate software and at least one programming language, learning how to analyse and display results.
- Acquisition of good working habits concerning both working alone (e.g. diploma thesis) and in teams (e.g. lab reports, including team-leading), achieving results within a specified time-frame, with an emphasis on awareness about professional integrity and on how to avoid plagiarism.

- Demonstrated proficiency in using English language, including subject area terminology, for literature search.

Comparison with learning outcomes of other study programmes of the same typology

The exits of the comparison with the learning outcomes of the Bachelor in Physics of the European Network of Physics Institutions (ENPI) are registered in the report "Characteristics of European Bachelors in Physics", edited by ENPI and updated every three years.
The last edition of the report is of 2012 and is available at http://www.ENPI.eu/bachelorinphysics/2012.

Standard B - Educational process

The study programme should assure students educational activities able to accomplish the established learning outcomes through contents, methods and times adequately designed and planned, take under control their development, assure a correct assessment of students' learning through suitable assessment methods and criteria, and establish appropriate criteria for students' progression in their studies.

Quality Requirement B1 - Admission qualifications and requirements

The study programme or the competent authority should define qualifications and requirements for the admission to the study programme adequate for a profitable participation of the students to the established educational activities, in particular of the first course year.

Admission to the study programmes *(Qualifications and requirements for the admission to the study programme, Assessment of the mastery of the admission requirements and Criteria of admission)*

All the students who have overcome the school-leaving examination can be admitted to the Bachelor in Physics independently from the school of provenance.
The requirements, the assessment tests and the criteria for the admission to the SPs are established at national level by the Ministry of Education, University and Research (MIUR). They are available at the Ministry web site (http://www.miur.it/universityadmissionrequirements/2013-14) and are also shown at http://www.schoolofMPNscience.unidoqup.it/bacheloradmissionrequirements.
The requirements for the admission to the Bachelor in Physics regard: general culture, verbal comprehension, logic, mathematics, physics.
The assessment of the mastery of the admission requirements is carried out through multiple choice tests, established by MIUR.
A minimum level of the mastery of the admission requirements is not established. Students who participate at the admission tests, which are carried out on the date established by the Ministry in all the national Universities which offer SPs in Physics, are included in a national ranking on the base of the grade obtained in the admission test and can choose the University where enrolling until the achievement of the available places.

Quality Requirement B2 - Design and planning of the educational process

The study programme should design a curriculum and characteristics of the didactic units consistent with the established learning outcomes. The study programme should also establish appropriate criteria for students' progression in their studies.
Furthermore, the study programme should plan the development of the educational process in such a way that students are able to achieve the learning outcomes in the expected time, according to a gradual process and activities coherent and coordinated with each other.

Curriculum

The curriculum of the Bachelor in Physics for the academic year 2013-14 is shown in attachment (Table "Curriculum - Academic Year 2013-14").

For each didactic unit of the curriculum the following information are shown:
- year and semester of delivery;
- ECTS credits;
- lecturer(s).

The curriculum is proposed by the Council of the Bachelor in Physics and approved by the Council of the Physics Department.

Characteristics of the didactic units

The characteristics of the didactic units are in attachment (Table "Curriculum - Academic Year 2013-14. Characteristics of the Didactic Units").
For each didactic unit the following information are shown:
- name;
- number of ECTS credits;
- course year / semester;
- lecturer(s);
- learning outcomes specific of the didactic unit and consistent with the established learning outcomes of the SP;
- contents
- schedule;
- instructional forms of education, also in terms of hours/credits for each form;
- teaching techniques, also in terms of number of hours/credits for each technique;
- assessment methods;
- assessment criteria;
- assessment metrics;
- preparatory didactic units;
- didactic material.

The definition of the characteristics of the didactic units is coordinated by the Didactic Commission of the Bachelor, particularly in order to avoid gaps or superimpositions in the definition of the specific learning outcomes and contents and to assure the suitability of the assessment methods to a correct assessment of the students' learning.

Characteristics of the graduation exam

The characteristics of the graduation exam are shown in attachment (Table "Characteristics of the Graduation Exam").
The following information are specified:
- workload, in terms of ECTS credits;
- requirements to be fulfilled by the final work;
- criteria for the attribution of the graduation grade.

Suitability of the curriculum to the achievement of the learning outcomes

The suitability of the curriculum to the achievement of the expected learning outcomes is shown in attachment (Table "Suitability of the curriculum to the achievement of the expected learning outcomes- Academic Year 2013-14"), where for each learning outcome the didactic units which contribute to its accomplishment are indicated.

Criteria for students' progression in their studies

Students' progression in their studies is regulated by the following criteria.

<u>Frequency of the didactic activities</u>
Frequency of the didactic units is compulsory.

To be admitted at the exam of each didactic unit students must have attended at least the 80% of the hours of didactic activities carried out in the didactic unit.
Working students are exempted only from the frequency of lectures.

Admission at the successive course year
To be admitted at the 2nd course year students must have accumulated at least 30 ECTS credits.
To be admitted at the 3rd course year students must have accumulated at lest 90 ECTS credits.

Training periods outside University
For carrying out training periods outside University students must have accumulated at least 150 ECTS credits.

International mobility
For carrying out periods of international mobility students must have accumulated at least 120 ECTS credits.

Admission at the graduation exam
To be admitted at the graduation exam students must have accumulated all the ECTS credits established in the curriculum, except the credits attributed to the graduation exam.

Part time students
Students who in an academic year acquire a number of credit less than 45 are considered 'part time student'.
The rules for progression in their studies of part time students are reported at http://www.physics.unidoqup.it/studentguide2013-14/parttimestudents.

Students who cannot attend the didactic activities for a long period for causes independent from their will
Admission at the exams of students who cannot attend the didactic activities for a long period for causes independent from their will is regulated time by time by the Didactic Commission of the Bachelor.

Calendar and timetable of didactic units and exams

The calendar and timetable of the didactic units for the academic year 2013-14 are available at http://www.physics.unidoqup.it/bachelorinphysics/didacticunits/calendar2013-14.

The calendar of the exams and the compositions of the exam commissions for the academic year 2013-14 are available at http://www.physics.unidoqup.it/bachelorinphysics/exams/calendar2013-14.

The calendar of the graduation exams and the composition of the exam commissions for the academic year 2013-14 are available at http://www.physics.unidoqup.it/bachelorinphysics/graduationexams/calendar2013-14.

Quality Requirement B3 - Realization of the educational process

The study programme should implement the educational process coherently with the designed and planned development.
The study programme should also control the development of the educational process, in order to check its correspondence with the designed and planned development, and the adequacy of the assessment tests to the learning outcomes and the correctness of the evaluation of the students' learning.

Correspondence with the designed and planned development

The Bachelor takes under control the correspondence of the development of the educational process with the designed and planned development through:
- the control of the lecture registers, which are on-line and have to be filled in real time by the

lecturers, by the President of the Council of the Bachelor;
- the survey of the students' opinions on the didactic units.

At the end of each semester the President refers at the Council the results of the control of the lecture registers. The President's report is attached to the minutes of the Council meeting. In the two semester if the last academic year (2012-13) there has been full correspondence of the development of the educational process with the designed and planned development.

The results of the monitoring relative to all the didactic units of the curriculum for the last academic year (2012-13) are shown at http://www.physics.unidoqup.it/bachelorinphysics/student'sopinionondididacticunits/results2010-13, while the results relative to the single didactic unit are made available only at the persons in charge of the Bachelor and at the lecturer.
The Bachelor takes into account the survey of the students' opinions on the didactic units in occasion of the revision process, in order to identify all the opportunities of improvement and adopt suitable actions.

Control of the assessment tests and of the evaluation of the students' learning

At the moment the Bachelor does not take under control the adequacy of the assessment tests to the learning outcomes and the correctness of the evaluation of the students' learning.
This question will be examined in occasion of the next revision process.

Standard C - Resources

The study programme should have at disposal teaching staff, facilities, financial resources, student support services and partnerships with businesses, research institutions and other Higher Education Institutions adequate for the accomplishment of the learning outcomes and able to make easier the students' progression in their studies.

Quality Requirement C1 - Teaching staff

The study programme should have at disposal teaching staff, including teaching support staff, adequate for the achievement of the established learning outcomes.

Teaching staff

The SP lecturers are listed in attachment (Table "Teaching Staff – Academic Year 2013-14").
The information shown for each lecturer are:
- academic or professional qualification;
- list of the didactic units he/she is in charge of, subdivided into didactic units of the Bachelor in Physics and didactic units of other SPs;
- for each didactic unit, if he/she is the holder or the title on the basis of which it is covered (e.g.: additional duty, contract, etc.).

It is also available the hyperlink at the CV of each lecturer, with the description of his/her scientific and/or professional interests, activities and results.

Criteria of selection of the lecturers

The assignment of the didactic tasks to the academic staff of the School is deliberated by the Physic Department on the basis of their competence. The assignment of the didactic tasks to external lecturers is awarded as a result of the public tender for titles. The model notice is available at http://www.schoolofMPNscience.unidoqup.it/publicnoticeforexternallecturers.

Opportunities offered to the teaching staff for improving their teaching skills and reaching acceptable standards

Every 3 years the School of Mathematics, Physics and Natural Sciences, which the Physics Department belongs to, organizes a course of 24+2 hours for the new lecturers of the SPs of the School, finalised to improve their teaching skills. In the last 2 hours of the course participants must gives two lectures in presence of the course teachers on topics agreed 24 hours before the lectures. If the evaluation by the course teachers is not positive, the course participants must give two other lectures after one month from the first, always in presence of the course teachers. In the case of evaluation still not positive, the procedure is repeated every 6 months until a positive assessment by the course teacher.

Teaching support staff

The SP teaching support staff is listed in attachment (Table "Teaching Support Staff - Academic Year 2013-14").
The information provided for each course unit which utilizes support teachers are:
- support teacher(s);
- his/her qualification;
- total number of hours of didactic workload;
- tasks.

Criteria of selection of the support teachers

The assignment of support teachers is deliberated by the Council of the Physic Department on proposal by the lecturers of the course units, after evaluation of the CV of the proposed support teachers.

Quality Requirement C2 - Facilities

The study programme should have at disposal facilities, with the associated equipment, quantitatively and qualitatively adequate for the development of the established educational activities and able to allow the application of the established didactic methods.

Classrooms

The classrooms of the Physics Department are listed in attachment (Table "Classrooms").
For each classroom at least the following information are shown:
- number of seats;
- supply of audiovisual equipments;
- availability of web connection;
- surveillance and assistance staff available.

The Bachelor in Physics utilizes the following classrooms: PD1, PD4, PD7, PD12.

Rooms for individual study

The rooms for individual study available at the Physics Department and utilized by the students of the Bachelor in Physics are two, ISR1 and ISR2.

- ISR 1
  - number of seats: 40
  - free;
  - opening time: 8.00-20.00 from Monday to Friday;
  - access: free;
  - no surveillance staff available.
- ISR 2
  - number of seats: 20
  - free;
  - opening time: 8.00-20.00 from Monday to Friday;

- access: free;
- no surveillance staff available.

Laboratories

The didactic laboratories of the Physics Department are listed in attachment (Table "Laboratories").
For each didactic laboratory at least the following information are shown:
- equipments or personal computers and software of interest for the didactic activities of the SP available;
- number of work places and number of students for work place;
- technical staff available.

The Bachelor in Physics utilizes the following laboratories:
- Informatics;
- Metrology;
- Experimental Physics.

Libraries

The students of the Bachelor in Physics utilize the library of the Physics Department.
The information on the library's:
- availability of updated bibliographical material of interest for the didactic activities of the SP;
- availability of web connections;
- services offered (consultation of books and journals, book rent, bibliographical researches, access to data bases);
- opening time and access rules;
- librarian staff available;

are available in attachment (Table "Libraries").

Other resources and special initiatives

The School of Physics makes available to students of its SPs the following resources:
- a canteen with a hundred seats;
- a residence with 25 beds;
- installations for the following sports: football, tennis, volleyball, basketball.

Quality Requirement C3 - Financial resources

The study programme should have at disposal financial resources adequate for the development of the educational process according to the designed and planned activities.

Needs of financial resources

The needs of financial resources are established for all the SPs of the Department (1 Bachelor and 3 Masters).
The needs for the academic year 2013-14 are shown in the table "Needs of financial resources for the didactic activities – Academic Year 2013-14" available in attachment.
A more detailed description of the needs of financial resources for all the SPs of the Department is reported in the minutes of the meeting of the Council of the Physics Department held on 25 October 2013 (available on-line only to authorized people).

Availability of financial resources

The availability of financial resources for the needs of all the SPs of the Department (1 Bachelor and 3 Masters) for the academic year 2013-14 is shown in the table "Availability of financial resources for the didactic activities – Academic Year 2013-14" available in attachment.
A more detailed description of the availability of financial resources for the needs of all the SPs of the Department is reported in the minutes of the meeting of the Council of the Physics Department held on 25 October 2013 (available on-line only to authorized people).

Quality Requirement C4 - Student support services

The study programme should have at disposal student support (orienteering, tutoring and assistance) services relevant to the educational process and able to make easier students' learning and progression in their studies.

Student administrative office

The student administrative office is organised and managed by the Central Administration of the University. Its main responsibilities are the students' enrolment and the management of the students' career.
Information on the:
- office organisation and management;
- available staff;
- activities in charge of the office;
- activities and results of the last academic year;

are available at http://www.unidoqup.it/studentoffice/schoolofMPNsciences (file "Student administrative office. Organization, Tasks, Result Academic Year 2012-13).

Orienteering service for students in entrance

The orienteering service for students in entrance is organised and managed by the School of MPN Sciences. Its main responsibilities are to favour a correct knowledge of the educational objectives and of the characteristics of the SPs of the School and to orient students in order to favour an aware choice of the SP.
Information on the:
- service organisation and management;
- available staff;
- activities in charge of the office;
- activities and results of the last academic year;

are available at http://www.schoolofMPNscience.unidoqup.it/orienteeringinentranceservice (file "Orienteering service for students in entrance. Organization, Tasks, Result Academic Year 2012-13).

Tutoring service

The tutoring service is organised and managed by the Physics Department. Its main responsibilities are to favour an effective insertion in the educational process of the SP and an

effective studies progression of the students.
Information on the:
- service organisation and management;
- available staff;
- activities in charge of the office;
- activities and results of the last academic year;

are available at http://www.physics.unidoqup.it/studentoffice/tutoringservice (file "Tutoring service. Organization, Tasks, Result Academic Year 2012-13).

Service for carrying out training periods outside University

The service for carrying out training periods outside University is organised and managed by the School of MPN Sciences. Its main responsibilities are the organisation and the management of training periods outside University.
Information on the:
- service organisation and management;
- available staff;
- activities in charge of the office;
- activities and results of the last academic year;

are available at http://www.schoolofMPNscience.unidoqup.it/trainingperiodsservice (file "Service for the development of training periods outside University. Organization, Tasks, Result Academic Year 2012-13).

Service for the students' international mobility

The service for the students' international mobility is organised and managed by the School of MPN Sciences. Its main responsibilities are the organisation and the management of the mobility of students in exit and in entrance.
Information on the:
- service organisation and management;
- available staff;
- activities in charge of the office;
- activities and results of the last academic year;

are available at http://www.schoolofMPNscience.unidoqup.it/studentsmobilityservice (file "Service for the students' international mobility. Organization, Tasks, Result Academic Year 2012-13).

Job placement service

The job placement service is organised and managed by the School of MPN Sciences. Its main responsibility is to favour the placement of the graduates in the labour market.
Information on the:
- service organisation and management;
- available staff;
- activities in charge of the office;
- activities and results of the last academic year;

are available at http://www.schoolofMPNscience.unidoqup.it/jobplacementservice (file "Job placement service. Organization, Tasks, Result Academic Year 2012-13).

Quality Requirement C5 - Partnerships

The study programme should have at disposal partnerships with national and international businesses, research institutions and other Higher Education Institutions quantitatively and qualitatively adequate for carrying out students' external education and mobility.

Partnerships for carrying out training periods outside University

The list of the active partnerships for carrying out training periods outside University and for each partnership the number of students of the Bachelor in Physics who have carried out training periods in the body in consideration in the last three academic (solar) years are shown in attachment (Table "Partnerships for carrying out training periods outside University").

Add a comment. In particular, comment the evolution of the number of students who carry out training periods outside University in the academic years considered.

Partnerships for carrying out international mobility periods

The list of the active partnerships for carrying out international mobility periods and the number of students of the Bachelor in Physics, in exit and in entrance, who have carried out periods of international mobility in the Institution in consideration in the last three academic (solar) years are in attachment (Table "Partnerships for carrying out international mobility periods").

Add a comment. In particular, comment the evolution of the number of students who carry out mobility periods University in the academic years considered.

Standard D - Monitoring and Results

The study programme should monitor the results of the educational process at least with respect to entrance students, students' learning, students' progression in their studies, students' opinion on the educational process, graduates' placement, in order to check the adequacy and effectiveness of the educational service provided.

Quality Requirement D1 - Entrance students

The study programme should monitor the entrance students in order to check its attractiveness.

Assessment of the mastery of the admission requirements

The results of the monitoring of the assessment of the mastery of the admission requirements by the entrance students enrolled in the first course year of the last three cohorts (from A.Y. 2010-11 to A.Y.2012-13) are in attachment (Table "Results of the assessment of the mastery of the admission requirements").

The following data are shown:

- N. of students with an admission grade between … and …;
- …
- N. of students with an admission grade > … .

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Enrolments in the first course year

The results of the monitoring of the enrolments in the first course year for the last three cohorts (from A.Y. 2010-11 to A.Y.2012-13) are in attachment (Table "Students enrolled in the first course year").

The following data are shown:

- number of the entrance students;
- geographical provenance;
- secondary school of provenance;
- grade of the school-leaving examination.

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Quality Requirement D2 - Students' learning

The study programme should monitor the students' learning in order to check the effectiveness of

the didactic units.

Students' learning

The results of the monitoring of the students' learning in the last three academic years (from A.Y. 2010-11 to A.Y.2012-13) are shown in attachment (Table "Results of the tests for the assessment of the students' learning").
For each course unit the following data are shown:

- number of students who have to take the examination in the academic year under consideration;
- number of students who have passed the examination in the academic year under consideration;
- medium value of the grades attributed to all the students who have passed the examination;
- grade variance.

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Quality Requirement D3 - Students' progression in their studies

The study programme should monitor the students' progression in their studies (in particular: dropouts, number of credits acquired at the end of each course year, time to graduation) in order to check the effectiveness of the educational process.

Enrolments in the different course years

The results of the monitoring of the enrolments in the different course years in the last three academic years (from A.Y. 2010-11 to A.Y.2012-13) are shown in attachment (Table "Enrolments in the different course years").
The results regard the number of students who pass from one course year to the successive one.

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Dropouts

The results of the monitoring of the dropouts in the last three academic years (from A.Y. 2010-11 to A.Y.2012-13) are in attachment (Table "Dropouts").
The results regard the number of dropouts.

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Credits acquired by the students

The results of the monitoring of the credits acquired by the students who pass from one course year to the successive one in the last three academic years (from A.Y. 2010-11 to A.Y.2012-13) are in attachment (Table "Credits acquired by the students passing from one course year to the successive one").
The results regard the median and the mean value, with the associated variance, of the number of ECTS credits with which students pass from one course year to the successive one.

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Graduation time

The results of the monitoring of the graduation time in the last three academic years (from A.Y. 2010-11 to A.Y.2012-13) are in attachment (Table "Graduates").
The results regard the number of graduates within the official length of the programme.

Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Quality Requirement D4 - Students' opinion on the educational process

The study programme should monitor the students' opinion on the educational process in order to check the perceived adequacy and effectiveness.

Students' opinion on the didactic units

The monitoring of the students' opinion on the didactic units is carried out on-line. The monitoring starts at the end of the lesson period for the didactic unit considered and finishes at the end of the first exam session after the end of the lessons.
The monitoring instrument is the questionnaire available in attachment (file "Questionnaire for the monitoring of the students' opinion on the didactic units").
The results of the monitoring relative to all the didactic units of the curriculum for the last three cohorts (from A.Y. 2010-11 to A.Y. 2012-13) are shown at http://www.physics.unidoqup.it/bachelorinphysics/student'sopinionondididacticunits/results2010-13 (file "Results of the elaboration of the students' opinion on the didactic units - from A.Y. 2010-11 to A.Y. 2012-13"), while the results relative to the single didactic unit are made available only to the persons in charge of the Bachelor and to the lecturer.
Present the results relative to each question considered in the questionnaire. It is preferable to represent the results using histograms or cake-diagrams than tables.
Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Students' opinion on the training periods outside University

The monitoring of the students' opinion on the training periods outside University is carried out on-line. Students who carry out training periods outside University are asked to fill the questionnaire in attachment (file "Questionnaire for the monitoring of the students' opinion on the training periods outside University"), within a month after the completion of the training period.
The results of the monitoring relative to training periods carried out in the last three academic years (from A.Y. 2010-11 to A.Y. 2012-13) are shown at http://www.physics.unidoqup.it/bachelorinphysics/student'sopinionontrainingperiodsoutsideuniversity/results2010-13 (file "Results of the elaboration of the students' opinion on the training periods outside University - from A.Y. 2010-11 to A.Y. 2012-13").
Present the results relative to each question considered in the questionnaire. It is preferable to represent the results using histograms or cake-diagrams than tables.
Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Students' opinion on the periods of international mobility

The monitoring of the students' opinion on the periods of international mobility is carried out on-line. Students who carry out periods of international mobility are asked to fill the questionnaire available in attachment (file "Questionnaire for the monitoring of the students' opinion on the periods of international mobility"), within a month after the completion of the mobility.
The results of the monitoring relative to periods of international mobility carried out in the last three academic years (from A.Y. 2010-11 to A.Y. 2012-13) are shown at http://www.physics.unidoqup.it/bachelorinphysics/student'sopinionon periodsinternationalmobility/results2010-13 (file "Results of the elaboration of the students' opinion on the periods of international mobility - from A.Y. 2010-11 to A.Y. 2012-13").
Present the results relative to each question considered in the questionnaire. It is preferable to represent the results using

histograms or cake-diagrams than tables.
Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Opinion of the final year students on educational process and support services

The monitoring of the opinion of the final year students on the educational process and on the student support services is carried out on-line. Final year students are asked to fill the questionnaire available in attachment (file "Questionnaire for the monitoring of the final year students' opinion on the educational process and on the student support services"), in occasion of their enrolment at the graduation exam.

The results of the monitoring relative to training periods carried out in the last three academic years (from A.Y. 2010-11 to A.Y. 2012-13) are shown at http://www.physics.unidoqup.it/bachelorinphysics/opinionfinalyearstudents/results2010-13 (file "Results of the elaboration of the final year students' opinion on the educational process and on the student support services - from A.Y. 2010-11 to A.Y. 2012-13").
Present the results relative to each question considered in the questionnaire. It is preferable to represent the results using histograms or cake-diagrams than tables.
Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Quality Requirement D5 - Graduates' placement

The study programme should monitor the graduates' placement in order to check the qualification spendability, the correspondence of the study programme educational objectives to and the adequacy of the study programme learning outcomes for the educational needs of the labour market.

Graduates' job placement

The monitoring of the graduates' job placement is carried out on-line every three years for all the students graduated in the academic years preceding the year of the survey (2008-09, 2009-10, 2010-11 for the survey carried out in 2012). Graduates placed on the labour market are asked to fill the questionnaire in attachment (file "Questionnaire for the monitoring of the graduates' job placement and of the employed graduates' opinions on the education received").
The results of the monitoring relative to the last survey carried out in 2012 are shown at http://www.physics.unidoqup.it/bachelorinphysics/graduates'jobplacement/results2012 (file "Job placement of the graduates in the AA.YY. 2008-09, 2009-10, 2010-11").
Present the results relative to each question considered in the questionnaire. It is preferable to represent the results using histograms or cake-diagrams than tables.
Add a comment. In particular, comment the evolution of the results in the academic years considered and compare the results of the SP with those obtained by other SPs of the structure the SP belongs to and/or the results obtained by other SPs of the same typology of other Universities, if any.

Prosecution of the studies in the second cycle programmes

The monitoring of is carried out every year by the Student Office of the University.
The results for the last three academic years (from A.Y. 2010-11 to A.Y. 2012-13) are shown at http://www.unidoqup.it/studentadministrativeoffice/prosecutionofstudiesinsecondcycleprogrammes/bachelorinphysics/results2010-13 (file "Prosecution of the studies in the second cycle programmes - from A.Y. 2010-11 to A.Y. 2012-13").
It is preferable to represent the results using histograms or cake-diagrams than tables.
Add a comment. In particular, comment the evolution of the results in the academic years considered.

Employed graduates' opinions on the education received

The monitoring of the employed graduates' opinions on the education received is carried out on-line every three years for all the students graduated in the academic years preceding the year of the survey (2008-09, 2009-10, 2010-11 for the survey carried out in 2012).
Graduates placed on the labour market are asked to fill the questionnaire available in attachment (file "Questionnaire for the monitoring of the graduates' job placement and of the employed graduates' opinions on the education received").
The results of the monitoring relative to the last survey carried out in 2012 are shown at http://www.physics.unidoqup.it/bachelorinphysics/ graduates'jobplacement/results2012 (file "Results of the elaboration of the opinions of the employed graduates' opinions on the education received - Graduates in the AA.YY 2008-09, 2009-10, 2010-11").
Present the results relative to each question considered in the questionnaire. When possible, it is preferable to represent the results using histograms or cake-diagrams than tables.

Employers' opinion on the graduates' education

The Bachelor in Physics does not monitor yet the employers' opinion on the graduates' education.

Standard E - Management system for quality

The institution the study programme belongs to should have a public quality assurance policy and an effective organization for the quality assurance of study programmes. The policy should be put into practice through the definition and adoption of an adequate and effective management system for quality of the study programmes, able to promote and assure their quality and the improvement of the effectiveness of the processes for the study programme management and of the associated results, and should assure its continual adequacy and effectiveness.
Furthermore, the study programme should guarantee the publicity of the information on its characteristics and results.

Quality Requirement E1 - Policy and organization for quality assurance

The institution the study programmes belongs to should have a public quality assurance policy and an effective organization for the quality assurance of study programmes.

Policy for quality assurance

The policy for the QA of SPs of the DoQuP University is set out in the document "Policy of the DoQuP University for the quality assurance of the study programmes" available at http://www.unidoqup.it/documentsoftheacademicsenate/policyforQAofSPs.
In particular it establishes that:

- SPs should fulfil the quality requirements established at national level by the competent authorities and the ones eventually established by the same institution which the study programmes belongs to;
- SPs should take the student as the centre of the teaching and learning process. In 'student-centred SPs' the focus should be on the competence development and the achievement of intended learning outcomes of the learning process by the students, and no more on what a student has been taught;
- the intended learning outcomes should meet international requirements and tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the SP;
- the intended learning outcomes should meet also requirements expressed by the labour market of reference of the SPs;
- the teaching staff of the SPs should be active in research as for academicians or in professional activities as for professionals. The research and professional activities should be documented in CVs publicly available;
- SPs should have at disposal all the facilities, with the associated equipment, quantitatively and

qualitatively adequate for the development of the established educational activities and able to allow the application of the established didactic methods, and student support (orienteering, tutoring and assistance) services relevant to the educational process and able to make easier students' learning and progression in their studies;
- the QA system of the SPs should be consistent with the *European Standards and Guidelines for the internal QA in the European Higher Education Area* and with the requirements established at his regard at national level;
- for the purpose of developing a quality culture among internal stakeholders (SPs' leaders, staff, students), institution should encourage the SPs to monitor their quality and implement improvements wherever required;
- stakeholders should be involved in the development and implementation of QA processes. In particular students, staff, alumni and representatives of the professional field should be involved in the evaluation of the SPs' quality on a regular basis.

Organization for quality assurance

The organization for the QA of SPs of the DoQuP University is based on the following structures:
- the Academic Senate, the composition of which is shown in the Statute, art. 15, available at http://www.unidoqup.it/statute, which is responsible for the establishment of the vision of the SPs' quality and the development of a quality culture and for the policy for the QA of SPs;
- the Quality Presidium, composed by:
  - the Vice Rector for the Didactics, who chairs it;
  - one representative per School;
  - the persons in charge of the following administrative departments: Planning, Assessment, Management Control and Statistics Department; Education, Higher Education and Student Services Department.

  The Quality Presidium is responsible for:
  - the definition of a QA system of the SPs consistent with the institution's policy and the support to the operational managers of the SPs as for its implementation;
  - the verification of the compliance with the procedures and timing of the QA system by the SPs and the monitoring of their results (Students in entrance, etc.);
  - the monitoring of the student support services;
  - the promotion of the improvement of the SPs' quality wherever required.
- The Evaluation Committee, the composition of which is shown in the Statute, art. 23, available at http://www.unidoqup.it/statute, which is responsible for the assessment of the quality of the policy, organization and processes for the QA of SPs, for the SPs' quality and for the subsequent formulation of guidelines and recommendations for improvement.

The deadlines for the review of the policy, organization and processes for the QA of SPs have been set as follows:
- 31 December: availability of the results of the SPs (Students in entrance, etc.) and of the monitoring of the student support services;
- 28 February: assessment of the quality of the policy, organization and processes for the QA of SPs and of the SPs' quality and compilation of the Annual Report by the Evaluation Committee, with the guidelines and recommendations for improvement;
- 31 March: on the basis of the Annual Report of the Evaluation Committee, definition by the Quality Presidium of the Recommendations to the Academic Senate for the revision/improvement of the policy and/or organization for the QA of SPs and of the Guidelines to SPs for the revision/improvement of the processes for the QA;
- 30 April: revision/improvement of the policy and/or organization for the QA of SPs of study by the Academic Senate on the basis of the recommendations of the Quality Presidium.

Quality Requirement E2 - Management system of the study programme

The study programme should adopt an adequate and effective management system, through the identification of the processes for a management for quality of the study programme and the definition of an adequate organisational structure.

Management system of the study programme

The processes for the SP management and the responsibilities for their management are shown in attachment (Table "Processes for the SP management and responsibilities for their management").

Add a comment on the adequacy and effectiveness of the management system.

The list the positions of responsibilities for the SP management, with the following information for each position:

- appointment;
- composition (only in case of Commissions, Committees, Working Groups, …).

is available in attachment (Table "Positions of responsibility").

The timescales for implementation of the processes for the SPs' management have been set as follows:

- compilation of the Revision Report by the SPs: by 31 January;
- identification of the educational needs of the labour market of reference: by 31 January;
- revision of the educational objectives and of the expected learning outcomes: by 28 February;
- redefinition of the admission requirements and design of the educational process: by 31 March;
- identification of teaching staff, facilities, financial resources and partnerships: by 15 May;
- planning of the educational process: by 31 May;
- compilation of the Documentation File and publicity of information on the SPs: by 31 May;
- availability of teaching staff, facilities, financial resources and partnerships: before the start of the new academic year.

Quality Requirement E3 - Revision

The study programme should periodically revise needs and objectives, educational process, resources, results and management system, in order to guarantee their constant adequacy and effectiveness and promote the improvement of the effectiveness of the processes for the study programme management and of the associated results.

Management modalities of the revision process

The revision of the Bachelor in Physics is carried out every year on January, when all the results of the precedent academic year are available and before the definition of the didactic offer for the successive academic year.

The revision is carried out by the Design and Revision Commission, composed by the President of the Council of the Bachelor, three members of the teaching staff, one representative of the administrative staff and two representatives of the students, appointed by the Bachelor Council, and a representative of the labour market of reference, appointed by the University/Labour Market Committee.

The information and data taken into account include:

- changes in the national laws and norms and/or in the statute and by-laws of the structure which the SP belongs to;
- resolutions of the structure which the SP belongs to and/or of its own bodies;
- outcomes of the relationships with the interested parties;
- needs and availability of resources;
- results of the monitoring activities;
- results of the self-assessment and external assessment activities.

Results of the revision process

The report of the revision carried out in 2013 is available in attachment (Table "Revision Report - Year 2013").

Quality Requirement E4 - Publicity of information

The study programme should make public full, up to date, easily acquired information, both quantitative and qualitative, on programme objectives, educational process, resources, results and management system.

Publicity of the documentation for the quality assurance of the study programme

The on-line documentation for quality assurance of the Bachelor in Physics is available at http://www.physics.unidoqup.it/bachelorinphysics/onlinedocumentationforQA.

Information and data on the following sections:
- Standard A;
- Standard B: Quality Requirements B1, B2;
- Standard C: Quality Requirements C1, C2, C4, C5;
- Standard E: Quality Requirements E1;

are public and available to all the interested parties.

Information and data on the following sections:
- Standard B: Quality Requirement B3;
- Standard C: Quality Requirement C3;
- Standard D;
- Standard E: Quality Requirements E2, E3, E4;

are reserved and available only to authorized people.