2013

REPORT

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

School of Science – Rimini Campus

Laurea (First cycle degree/ Bachelor - 180 ECTS) in Chemistry and Technologies for the Environment and Materials A.Y. 2013/2014

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INDICE

WHAT IS THE STUDY PROGRAMME REPORT?

What is the Study Programme Report?
The Study Programme Report provides updated information which is important for the purposes of Quality Assurance and is published annually by the University of Bologna.
The main aspects of the teaching programme are described in detail, with a view to assuring the principle of transparency and promoting self-assessment and continuous improvement processes.
The document provides a concrete overview of the features and results of the Study Programme for students, families, employers and so on.
For example, regarding the current issue of employment, it describes the learning outcomes and career opportunities; it also includes statistics on the percentage of employed graduates (D.4. Employment situation).
The document is organised into five sections and a glossary:

A. Presentation and prospects
Key information on the Study Programme, including the expected learning outcomes, career opportunities and further studies.

B. Teaching and Learning
The updated course structure diagram with the full titles and listings of the course units and the latest published lecture timetable.

C. Resources and services
The list of teaching staff and their relative curricula, the offices (secretariats), services (work placements) and infrastructures (libraries, laboratories) available to students.

D. The Study Programme in Figures
Key data shows how many students are enrolled, how many have been assigned additional learning requirements, how many drop out after the first year, how many graduate in line with the programme schedule, the opinions of attending and graduating students on the teaching programmes and information concerning graduate employment.

E. Find out more: the quality of your Study Programme
How the quality system applied to your Study Programme works. The quality system of your Study Programme is a set of processes and responsibilities adopted to guarantee the quality of all Study Programmes at the University of Bologna.

NOTES:

- Reports are available for all Study Programmes for which it is possible to enrol in the first year in academic year 2012/2013: the information and data provided is as updated as possible.

- Sections A, B and C provide data for the academic year 2012/2013.

- Section D presents data regarding the Study Programmes in the last three academic years.

- The information and data were taken from the University databases and the reports published by the Statistical Observatory of the University of Bologna and AlmaLaurea, and are updated to **15 June 2012.**

A. PRESENTATION AND PROSPECTS

This section presents the key information concerning the Study Programme, including the expected learning outcomes, career opportunities and further studies, updated to the academic year 2013/2014.

A.1. PRESENTATION

This paragraph provides information on the specific learning outcomes of the Study Programme and the curriculum.

The specific objective of this first-level Degree programme is to train professional chemists with a sound basic preparation in chemistry at large and specific knowledge and professional skills in the field of specialisation chosen ('Traditional and Innovative Materials' or 'Environment, Energy, Waste').

- *Traditional and Innovative Materials*: New molecular, metallic, polymeric and ceramic materials and their composites have become as important as the traditional materials over the past few decades; together, they play a primary role in structural, thermo-mechanical, electric, electronic, biomedical applications and as functional components in general. The choice of the most suitable material for the type of application for a specific manufactured product and its components has a relevant importance in view of the functional and commercial success of the finished product.

This specialised field of study serves the purpose of preparing skilled professionals capable of operating in the chemical industry in general, and more specifically in the industries dealing with the production and manufacturing of metallic, polymeric, ceramic materials or their composites, as well as in the application of materials in the manufacturing of products or components or derivatives. The knowledge acquired will also allow them to work in quality control laboratories and in the technological development of these materials. The traditional and advanced technologies of the ceramic industry will play a particular role because of the considerable importance which this industry holds in terms of number of employees and sales – in Italy in general, but morespecifically in Emilia-Romagna.

- *Energy, Environment, Waste*: At the end of the curriculum, these graduates will have acquired general knowledge of the chemical aspects of environmental issues related to anthropic processes; specific knowledge in the chemistry of pollutants and techniques for characterisation, analysis and control of pollutants in the environment; knowledge of technologies for monitoring environmental pollution and emissions from industrial plants; knowledge of technologies suitable for reducing the environmental impact, treating and disposing of waste, recovering materials and energy; knowledge of the basic problems pertaining to the life cycle (LCA) of waste, the assessment of impacts in the different environmental sectors of the produced effluents (EIS-EIA) and environmental monitoring; specific knowledge in the area of environmental legislation, with specific reference to standards for waste treatment and disposal, environmental safety and monitoring; basic knowledge of corporate management and certification procedures for products and processes.

A further aim of the degree programme is to provide the students with solid scientific grounding in core and complementary chemistry fields, thus making possible the access to other 2nd cycle or Master's degree programmes in the relative fields.

A.2. ADMISSION REQUIREMENTS

This paragraph provides information on the knowledge required for admission to the Study Programme.

To access the course, the student must posses a secondary-school diploma obtained in Italy or equivalent qualified diploma got abroad. Said diploma should refer a to five-year duration of the secondary school or, alternatively, to a four-year duration plus one supplementary year or, if inapplicable , to the assigned learning formative debt.

The following knowledge and capabilities are also required: logical reasoning and skill to use the main methods of elementary mathematics, also applied to common situations occurring in the experimental sciences.

The check of this basic knowledge and capabilities as attained in the previous course of studies is done through a written examination (*entrance test*), which is organised at the end of September/beginning of October and repeated in December. The questions will span from algebra and geometry to technological aspects, and could include elements of statistics and probability.

Before the test preparatory activities are offered. Candidates not passing the entrance test will be assigned *Additional Learning Requirements* (ALR). However, failure to pass the test does not preclude the candidate from enrolling on the course of study – it implies his/her attendance of one or more tutorships listed in the *Degree Programme Teaching Regulations and Curriculum*. These tutorships are open also to the students who have passed the entrance test.

The ways to complete the ARL as well as the assessment methods, described in the *Degree Programme Teaching Regulations*, are:

a. passing a **new entrance test**, proposed again once in late Spring, *or,*

b. passing a **specific examination** after the tutorship in Mathematics, *or,*

c. passing the **standard examination** of "Mathematics with Computer Lab" or of "General and Inorganic Chemistry and Laboratory" (first semester courses).

To complete the ARL the student may also ask to use learning formative credits if obtained in the realm of the Piano Lauree Scientifiche of the Italian Ministry of University and Research (MIUR) or similar projects (not less than 2 credits, attained before the enrolment) – the Course Committee will approved based on the consistency of these credits with the course.

He students who will not complete the ARL within the first year of the course (in August-September, within a date fixed by the University Council) will be enrolled again in the first year of course the next academic year as 'repeating student'. Within this next year they have to complete the ARL in one of the above-mentioned ways.

The students already enrolled at the Bologna University or any other University in previous academic years can apply for this course without the need to pass the above-mentioned test about knowledge and skills provided they have already obtained a proper CFU number that is consistent with the course – consistency and number being defined by the Course Committee.

Types and levels of knowledge and skills will be periodically revised on the basis of the experience acquired by analysing the students' performance during the first-year course of the previous academic years as well as the performance in the examinations and the planned tutorships activities. This required knowledge will be published in the *Degree Programme Teaching Regulations*.

A.3. LEARNING OUTCOMES

This paragraph provides information on the knowledge and skills students will have acquired by the end of the Programme.

knowledge and understanding

Graduates:

- possess basic knowledge of mathematics: algebra, study of functions, differential and integral calculus, numerical analysis;
- possess basic knowledge of physics: error analysis, units and systems of units, mechanics, electromagnetism and optics;
- possess basic knowledge of chemistry: chemical terminology and nomenclature, composition units, chemical reactions and their main features, properties of elements and their compounds, structural aspects of elements and their compounds, including stereochemistry;
- understand the principles of inorganic chemistry: structure, properties and reactivity, chemical bond, synthesis and characterisation of coordination compounds;
- understand the principles of quantum mechanics and their applications in describing structure and properties of atoms and molecules, the characteristics of different states of matter, the principles of chemical thermodynamics, fundamentals of kinetics;
- understand the principles of mechanistic interpretation of chemical reactions, catalysis, homogeneous and heterogeneous equilibria and simultaneous equilibria;
- understand structure and properties of organic and organometallic compounds, the nature and behaviour of functional groups, the main synthetic pathways in organic chemistry, the structure and properties of important biomolecule classes, the foundations of polymer science and the properties of polymeric products;
- understand the chemistry of biological systems and of industrial microbiology as well as the main technological applications of enzymes and microorganisms and the correlation between properties and molecular structure of products and materials;
- understand the principles of the main methods of qualitative and quantitative chemical analysis, including the features of the main instruments and their performance (e.g., gas chromatography and liquid chromatography), detection systems, chemical and spectrometric techniques and the quality parameters of analytical methods (precision and accuracy, response linearity, sensitivity, selectivity, significance tests).

The above-mentioned knowledge and understanding skills are achieved through attendance lectures and seminars, participation in exercise sessions and experimental laboratories organised for the various disciplines grouped under 'Learning Activities in Main Core Fields'.

The described learning outcomes shall be assessed mainly through written and oral exams, as well as the results of laboratory work (compulsory).

applying knowledge and understanding

Graduates:

Possess basic computer skills: Operating systems, word-processing, spreadsheets, use of databases and the Internet; and will be able to manage information, including that obtained from on-line research.

Have laboratory and practical skills: safety in the chemical laboratory, awareness of the chemical risk, and compliance with procedures, regulations and legislation.

Will be able to operate autonomously and confidently in basic operations, will have practical skills in performing standard procedures for synthesis, purification, analysis and characterisation as well as using common techniques and instruments.

Will be able to plan and carry out an experiment; will have independent judgement skills in evaluating, quantifying and presenting results.

As part of the specialised field chosen ('Traditional and Innovative Materials' or 'Environment, Energy, Waste') graduates will have the following technological-applicative abilities, documented in the Diploma Supplement issued by the University:

a. Traditional and Innovative Materials:

Graduates:

Will have theoretical and practical knowledge of traditional materials: metals, ceramics, polymers, semiconductors and composites; will also have knowledge of innovative materials: biocompatible ceramics, ceramics for high-performance uses, organic and inorganic materials, nanostructured materials, etc.

Will have knowledge in science and technology of materials: energy content and eco-compatibility; material resources, reserves and recycling; structure and microstructure; shaping of metals, moulding of polymers and glass manufacturing; shaping, pressing and sintering of ceramic materials, technology of binders; composites; conductors and semiconductors; physical properties of materials and control of these properties according to international standards.

Understand metallic materials: metallurgical processing of iron, aluminium, copper and titanium, and basic concepts concerning their mechanical properties; classification and state diagrams of the main industrial alloys, their thermal and mechanical treatment, origin of defects, fracture mechanisms and behaviour in operation; influence of temperature and chemical interactions; main analysis techniques (scanning electron microscopy, energy dispersive spectroscopy for microanalysis, X-ray diffractometry, etc.); durometers and machines for resistance tests.

Will have knowledge about polymers: chemical synthesis of polymers, structure-property relationships, characterisation techniques of functional and structural polymeric materials.

Will have knowledge of physical chemistry of materials: physico-chemical, mechanical, optical, rheological properties; properties of the individual molecules and of their self-organisation in condensed phase (solid, glass, liquid crystals, etc.); applications (colloids, polymers, catalysts, electronic devices, nanotechnologies, etc.).

Will have knowledge of industrial chemistry: structure and economics of the chemical industry; chemical processes for the production of innovative inorganic materials and nanomaterials, of ceramic materials, enamels, glass and pigments; control of the main operation parameters; applied rheology; solid properties as a function of thermal treatments; optimal choice of the process depending on the material; introduction to Quality/Safety/Environment systems; intellectual property.

Will have knowledge of unit operation in the chemical and ceramic industry: materials and energy balances, fluid flow, heat transfer and heat exchangers, interfacial mass transfer; main types of chemical reactors and basic design and rating tools; operating principles of selected separation processes and elementary design tools and choice criteria of relevant equipment; flow sheets and block diagrams; ceramic mixtures and relevant industrial supports; dry and wet processes, modelling and moulding processes; drying; ventilation systems; water supply and the production and distribution of compressed air.

b. Energy, Environment, Waste:

Graduates:

Will have knowledge of the processes involved in the various environmental compartments: air, water, soil.

Will have knowledge of the global change, the greenhouse effect, acid rain, waste-related issues. Will be aware of specific cases related to the chemical industry as well as of the legislation concerning the main environmental issues.

Will understand the effects of the main pollutant classes, their reactions and toxic action inside the organisms.

Will be able to calculate the pollutant distribution among different environmental compartments for equilibrium and non-equilibrium systems.

Will be able to perform bibliographical searches on the chemical, physical and toxicological parameters related to the most common pollutants.

Will know about control procedures and standardisation methods applied in the various environmental areas as well as the main monitoring methods of pollutants in the different environmental matrices (air, water, soil).

Will have knowledge of methods for sampling, storing and treating of samples and of the main analytical techniques for determining the main pollutants.

Will know the main instrumental analytical techniques used in the environmental sector and have the necessary theoretical and practical knowledge to plan and optimise an environmental analytical survey.

Will have knowledge about the environmental certification standards in the European Union: ISO standards and EMAS regulation; analysis and management procedures for obtaining various types of environmental certification, including Life Cycle Assessment of the Integrated Environmental Monitoring System, risk analysis, environmental labelling.

Willbe familiar with the guidelines for the preparation of an ecobalance of a production system, the assessment of direct and indirect environmental impacts, the definition of possible lines of action.

Will be able to use software tools for drafting Life Cycle studies of processes and products and for using validation and certification tools.

Will have knowledge on the production of energy as well as the Italian and international scenario as for the use of fossil fuels and alternative sources; will have knowledge on renewable energies: efficiency of production systems, capacity and limiting factors, direct and indirect environmental impacts deriving from different production processes, energy recovery and saving ensuing from correct waste management, technologies and procedures for alternative and sustainable energy production.

Will have knowledge of environmental technologies, the management and recycling of waste: main operating principles of liquid and gas effluent treatment techniques, elementary equipment design and rating, aspects related to various equipment operation.

Will have knowledge about correct waste management and understand the possibility to use the most widespread technologies; will be familiar with the theoretical tools to be used for the optimal choice of current and future technologies through the correct analysis of physico-chemical, thermodynamic and fluid dynamic parameters for each technology; will be aware of issues related to Waste Recycling within an Integrated Management System, in the national and European framework.

Will have knowledge about recovery and matter and energy enhancement techniques for environmental sustainability; will know the Best Available Technologies (BAT) and the operating conditions of environmental processes.

Will know the fundamentals of unit operations: material and energy balances; fluid flow; heat transfer and heat exchangers; interfacial mass transfer; the main types of chemical reactors and basic design and rating tools; operating principles of selected separation processes, design and rating tools and choice criteria for relevant equipment.

Will have knowledge of industrial chemistry and polymer science: main classes of raw materials and reactions used in industrial chemical production; will understand the principles of process management and the assessment of chemical reactions efficiency parameters in industrial processes as well as of the aspects related to safety and environmental compatibility; will know the main chemical syntheses of polymers, structure-property relationships and the relevant techniques for their characterization, recovery and recycling.

Contact with the production and business world.

Contact with the external world is considered of particular importance and is achieved through internships in companies and public or private bodies. This offers the opportunity to consolidate the knowledge and understanding acquired during the study programme.

The above-mentioned understanding abilities and knowledge are achieved firstly through the critical reflection on the texts proposed for self-study and the practical application in laboratory work integrated with the core and complementary course units. The ability to apply knowledge to solve real problems in the chemical industry is an important element of the elective course units. Students may also acquire practical specialist knowledge in special areas by autonomously selecting a number of course units.

Assessment of acquired abilities is done through written and oral exams, the production of written reports on assignments as well as problem solving activities, which imply the execution of tasks to demonstrate the student's command of tools, methods and critical autonomy.

making judgements

Graduates:

will be able to plan and conduct experiments; defining timing and methods, exercise independent judgement for the quantitative assessment;

will have good organisational skills, so as to meet schedule;

will be able to analyse and pay attention to details.

Judgement and the ability to plan and conduct the experiments are developed, in particular, during practical sessions, seminars and the production of written reports in laboratory-based course units in the core and elective subject areas.

Judgement skills are assessed by the staff in charge of laboratory, based on the students' ability to work autonomously as well as in groups during the experimental activities. The coherent selection of course units in the students' personal study programme will also be assessed.

communication skills

Graduates:

will be able to communicate orally and in writing in their own language and in another European language (English); they must develop interpersonal skills, and will be able to interact with other people and to collaborate in a team.

Written and oral communication skills are developed in particular during seminars, problem sessions and learning activities, which also require the preparation of written reports on assignments and subsequent oral presentation, also by using multimedia supports and computer demonstrations. The communication skills will be assessed through the production and presentation of a dissertation for the final examination.

In the problem sessions in class and in the laboratories, students are encouraged to intervene in open discussions; to improve their communication skills they are encouraged to clearly and consistently arise doubts and/or requests for clarification on specific subjects.

learning skills

Graduates:

will acquire a sound study method, the ability to continue their professional growth, to work towards objectives as a part of a group or individually.

They will show curiosity and willingness to continuously broaden their knowledge about science, technological areas, the market and existing products.

They will be able to adapt themselves to different working environments and topics, and collect and critically consider different sources of chemical information, data and literature.

Learning skills are acquired throughout the programme of study, particularly through individual study and the activities in the preparation of the final examination.

The learning level is evaluated through continuous assessment during the activities which require the presentation of data found autonomously as well as through tutoring activities related to the implementation of projects and evaluation of the individual learning skills developed during the activities in preparation of the final examination.

A.4. CAREER OPPORTUNITIES

This paragraph provides information on the occupational profile, functions and fields of employment available to graduates of this Programme.

Graduates may fill the following professional roles and related functions in the given fields of employment:

1. Traditional and Innovative Materials:

Professional roles: Materials Chemist.

Professional areas:

• industrial R&D technician and materials laboratory technician;

• Quality/Safety System Manager and technical customer care.

Material chemists collaborate, in accordance with their skills and under the supervision of the company management, in activities requiring the application of chemical procedures and protocols for the development of traditional and innovative materials.

Their function consists in applying predefined protocols and consolidated knowledge as part of service or production activities.

In particular:

1.1. They collaborate in the management and operation of conventional and innovative material production plants.

They deal with diagnostic problems related to materials properties and behaviour, also using complex chemical and instrumental techniques. They deal with any diagnostic problems related to complaints and customer care.

They carry out analyses of the materials chemical behaviour and highlight any aspects affecting environmental, economic and safety issues.

They are involved in the tuning of chemical processes on pilot-scale and/or production, and in the scale-up for industrial applications. They are involved in the definition of production schedules as well as the planning of periodic downtimes.

1.2. They ensure constant control of all company activities, from procurement to production, to the launching of the product on the market, as a part of predefined series of tests and laboratory work.

They ensure efficiency in laboratories by adjusting/updating the instruments and are constantly up-to-date as the relevant standards. They ensure chemical safety in the workplace.

They interact with the company management, R&D laboratories, production, and technical assistance, while providing advice on the subjects of competence.

They prepare operational procedures (manuals, instructions, emergency plans, etc.) for the correct use of certified systems.

They provide advice on corrective measures to adopt for the improvement of product technological-practical characteristics, also in response to Customer requirements.

2. Energy, Environment, Waste:

Professional roles: Environmental protection and waste management Chemist.

Professional areas:

• Environmental control and monitoring, Certification, Quality and Safety technician;

• Environmental Protection sustainable energy and Waste Management technician.

Environmental protection and waste management chemists collaborate, according to their professional skills and under the supervision of company management, in activities which require the application of chemical procedures and protocols with in order to control and maintain environmental, operation and safety standards for equipment, plants and related technical systems, including waste disposal and recycling systems and the management of sustainable energy forms.

Their function consists in applying predefined protocols and consolidated knowledge as part of service or production activities.

In particular:

2.1. They conduct chemical analyses and quality control, which also require good command of complex chemical techniques and instrumental analysis. They provide technical assistance by identifying problems related to Environment, Quality and Safety.

They prepare reports on their analyses and results.

They present proposals for the improvement of control procedures.

They control company activities in order to ensure these are carried out in compliance with provisions on environmental protection, safety in the workplace and health protection.

They keep contacts with the bodies in charge of controls of effluents, work environment and ecological problems.

They conduct risk assessment and draft safety sheets.

They oversee the preparation of environmental impact assessments.

They keep abreast of the relevant regulations and standards.

They prepare operating procedures for certified systems in the area of Environment, Quality and Safety.

2.2. They help find and design solutions for continuous improvement of the reliability and environmental and energy efficiency of the plant.

They detect and eliminate plant anomalies regarding environmental and energy efficiency.

They implement methods and technologies for the reduction of environmental impact from production activities, and deal with the treatment, disposal and recycling of waste.

They interact with the company management, R&D laboratories, production and technical assistance, providing instructions and advice on the subjects of competence.

They deal with waste management, disposal and recycling.

Career opportunities:

- Chemical and materials industry, and client-companies of said chemical and materials industry: R&D, production and logistics, technical assistance, environment and quality.
- Services: analysis laboratory, environmental management and plant laboratories.
- Public and private bodies: municipal and industrial waste treatment and disposal.

The degree programme project has been submitted to selected external stakeholders in order to receive their opinions and feedbacks on the learning outcomes and the professional profiles.

A.5. OPINION OF SOCIAL PARTNERS AND POTENTIAL EMPLOYERS

This paragraph describes the outcome of the consultation with the representative employment and trade organisations.

This information is not available in English at this time.

A.6. FURTHER STUDIES

It gives access to second cycle studies (laurea specialistica/magistrale) and master universitario di primo livello.

B. TEACHING AND LEARNING

This section describes the updated course structure diagram (for academic year 2013/2014), with the full titles and listings of the course units and the latest published lecture timetable.

B.1. COURSE STRUCTURE DIAGRAM

The link takes you to the Study Programme course structure diagrams. You can also access to each course unit content.

- Study plan: all course units in the programme

B.2. CALENDAR AND LECTURE TIMETABLE

The links take you to the teaching calendar (exam session and final examination session) and the lecture timetable (in Italian).

- Lecture timetable
- Exam sessions
- Final examination sessions

C. RESOURCES AND SERVICES

This section provides a list of teaching staff and their relative curricula and and description of the services available to students for the academic year 2013/2014.

C.1. TEACHERS

The paragraph lists the lecturers who teach in the Study Programme: from here you can access the personal web pages of each one. Information updated to 28 May 2013 (in Italian).

Permanent teaching staff:

Basile, Francesco	Fornasari, Giuseppe	Morselli, Luciano	Tamassia, Filippo
Bernardi, Elena	Fusina, Luciano	Mulazzani, Michele	Tarroni, Riccardo
Berrettoni, Mario	Grossi, Loris	Passarini, Fabrizio	Vassura, Ivano
Caretti, Daniele	Marotta, Emanuela	Pinelli, Davide	Zacchini, Stefano
Femoni, Cristina	Mazzanti, Andrea	Ridolfi, Marco	Zanotti, Valerio
Fochi, Mariafrancesca	Montante, Giuseppina Maria Rosa	Setti, Leonardo	

C.2. STUDENT SERVICES: OFFICES

C.2.1. FUTURE STUDENTS

The link take you to the webpage which provides specific information about the offices and the services for the future students (in Italian).

- Future students

C.2.2. ENROLLED STUDENTS

The link take you to the webpage with the information on the offices and the services for the enrolled students (in Italian).

- Enrolled students

C.2.3. INTERNATIONAL STUDENTS

The link take you to the webpage with the information on the offices and the services for the international students (in Italian).

- International students

C.2.4. GRADUATES

The link take you to the webpage with the information on the offices and the services for the graduates (in Italian).

- Graduates

D. THE STUDY PROGRAMME IN FIGURES

Information on students' starting their university careers, how many students are in line with the regular programme, opinions of students and graduates on the teaching programmes and information concerning graduate employment.

This section provides the data of the last academic years for the Study Programme (SP) and a comparison with similar Study Programmes. The University of Bologna has divided its Study Programmes into four groups:

- *BIOMEDICAL group: Study Programmes of the Schools of Pharmacy, Biotechnology and Sport Science; Medicine; Agriculture and Veterinary Medicine*

- *SCIENTIFIC-TECHNOLOGICAL group: Study Programmes of the Schools of Engineering and Architecture; Sciences*

- *SOCIAL SCIENCES group: Study Programmes of the Schools of Economics, Management, and Statistics; Law, Political Sciences*

- *HUMANITIES group: Study Programmes of the Schools of Arts, Humanities, and Cultural Heritage; Foreign Languages and Literatures, Interpreting and Translation; Psychology and Education*

The section presents the results of the Study Programme for the last three academic years.

Main data shows how many students enrolled, the number of students assigned OFA, how many drop out after the first year, how many graduate in line with the programme schedule, the opinions of attending and graduating students on the teaching programmes and information concerning graduate employment.

The information and data presented in this section, updated to 28 May 2013, were taken from University databases and AlmaLaurea.

Study Programmes may be subject to degree programme system modifications from one academic year to the next, and the data provided in this section may refer to a programme with a slightly different system to the one currently running (such as programme title, course structure diagram and list of lecturers). However, indicatively the data presents the general trend of the Study Programme over the past three years.

Most of the Study Programmes running at the University of Bologna have been reformed in compliance with DM 270/04, most of them from the academic year 2008/2009. In the reports provided for these Programmes, paragraph D.5. refers to the Study Programmes as they were presented prior to the reform.

D.1. STUDENTS STARTING THEIR UNIVERSITY CAREERS

Characteristics of incoming students at the beginning of their university careers. Tables and graphs provide information on the number of registered students, focusing on the characteristics of the students, results of any entrance tests and the students assigned any additional learning requirements.

D.1.1. ENROLMENTS AND REGISTRATIONS

The **graph** shows the number of students enrolled in the 1st year compared with the average of similar Study Programmes (which belong to the same group).

In addition, the **table** shows the total number of registered students and the total number of enrolled students.

Data of the Study Programme is compared with the average of the Study Programmes of average of similar Study Programmes (which belong to the same group) for the indicated academic years.

First year enrolments

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)
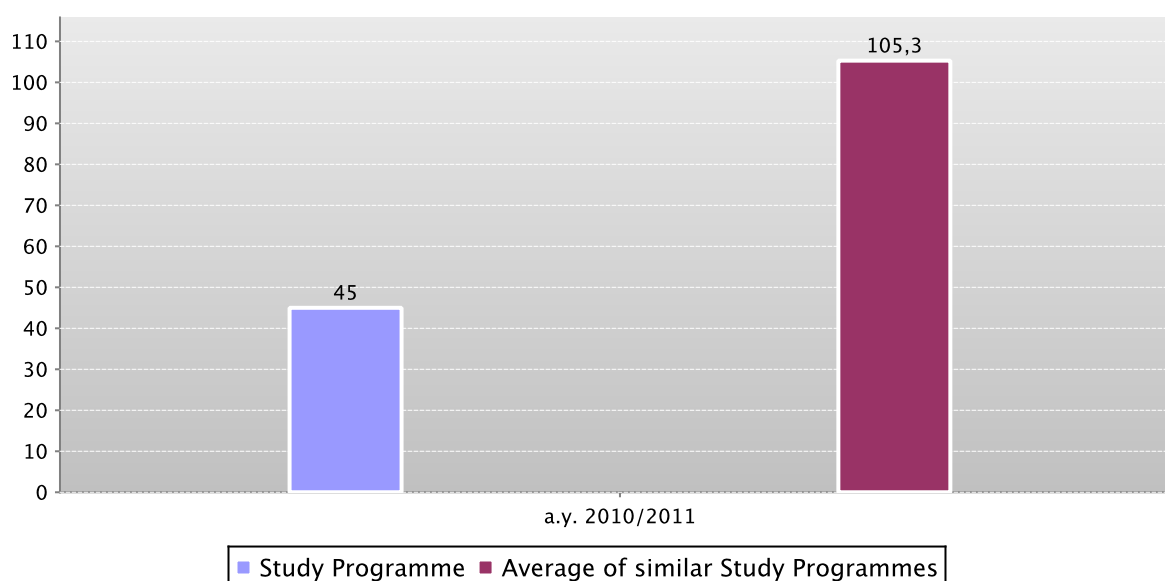
Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)
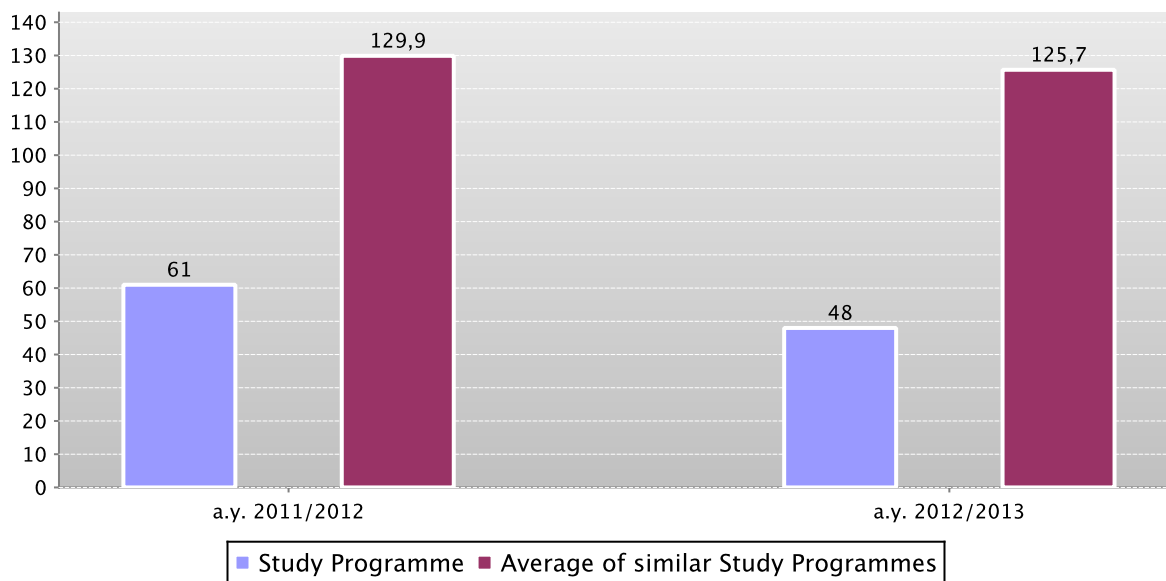
Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

	a.y. 2010/2011		
	Registered students	N. first year enrolments	Total N. enrolled students
Study Programme	42	45	103
Average of similar Study Programmes	97,8	105,3	152,7

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)

	a.y. 2011/2012			a.y. 2012/2013		
	Registered students	N. first year enrolments	Total N. enrolled students	Registered students	N. first year enrolments	Total N. enrolled students
Study Programme	55	61	129	50	48	124
Average of similar Study Programmes	118,6	129,9	161,1	113	125,7	160,1

D.1.2. ADDITIONAL DATA ON STUDENTS' STARTING THEIR UNIVERSITY CAREERS

D.1.2.1. CANDIDATES REGISTERED FOR THE ENTRANCE EXAM

In academic year 2012/2013 access to this Study Programme was not restricted.

D.1.2.2. INCOMING STUDENTS

Geographic origin, type of high school certificate, age and gender of students.
Data shows a homogeneus group of students (cohort) which started together their academic career. Students which have passed to an other Study Programme, transferred from an other university, or registered to a 2nd degree are not included.
The **tables** show the number, geographic origin, gender, age, type and grade of high school certificate of students enrolling in the degree programme.
Data of the Study Programme is compared with the average of the Study Programmes of average of similar Study Programmes (which belong to the same group) for the indicated academic years.

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

		Registered students	Geographic origin					Gender		Average age of registered students		
			Students coming from the province of the Study Programme site	Students coming from other provinces where Unibo has a site	Students coming from other provinces of Emilia Romagna region	Students coming from other Italian regions	Students coming from abroad	M	F	19 or less	20 - 24	25 or more
Students 2010/2011	Study Programme	42	42,9%	23,8%		31,0%	2,4%	61,9%	38,1%	81,0%	16,7%	2,4%
	Average of similar Study Programmes	97,8	34,6%	20,3%	7,6%	35,2%	2,3%	69,7%	30,3%	81,6%	16,1%	2,2%

		High school certificate					Grade of High school			
		Vocational schools	Technical Colleges	High school specializing in education and in psycho-pedagogical science	High schools specializing in classical studies, modern languages, science education	Other Italian or foreign high schools	Grade ranging from 60 to 69	Grade ranging from 70 to 79	Grade ranging from 80 to 89	Grade ranging from 90 to 100
Students 2010/2011	Study Programme	7,1%	31,0%	2,4%	57,1%	2,4%	42,9%	26,2%	23,8%	7,1%
	Average of similar Study Programmes	2,9%	29,3%	0,9%	60,8%	6,0%	19,6%	27,7%	25,0%	26,4%

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)

		Registered students	Geographic origin					Gender		Average age of registered students		
			Students coming from the province of the Study Programme site	Students coming from other provinces where Unibo has a site	Students coming from other provinces of Emilia Romagna region	Students coming from other Italian regions	Students coming from abroad	M	F	19 or less	20 - 24	25 or more
Students 2011/2012	Study Programme	55	45,5%	7,3%	1,8%	41,8%	3,6%	61,8%	38,2%	74,5%	21,8%	3,6%
	Average of similar Study Programmes	118,6	33,4%	19,0%	7,8%	37,7%	2,2%	65,1%	34,9%	79,5%	18,1%	2,4%
Students 2012/2013	Study Programme	50	52,0%	28,0%		20,0%		52,0%	48,0%	80,0%	20,0%	
	Average of similar Study Programmes	113	30,9%	20,0%	7,9%	38,8%	2,4%	65,6%	34,4%	80,5%	17,3%	2,2%

		High school certificate					Grade of High school			
		Vocational schools	Technical Colleges	High school specializing in education and in psycho-pedagogical science	High schools specializing in classical studies, modern languages, science education	Other Italian or foreign high schools	Grade ranging from 60 to 69	Grade ranging from 70 to 79	Grade ranging from 80 to 89	Grade ranging from 90 to 100
Students 2011/2012	Study Programme	5,5%	34,5%	1,8%	50,9%	7,3%	34,5%	36,4%	10,9%	18,2%
	Average of similar Study Programmes	2,7%	27,9%	2,0%	61,1%	6,3%	19,6%	26,4%	24,2%	27,2%
Students 2012/2013	Study Programme	4,0%	40,0%	14,0%	42,0%		26,0%	28,0%	24,0%	22,0%
	Average of similar Study Programmes	2,5%	27,3%	2,0%	62,3%	5,9%	17,5%	26,6%	26,5%	24,9%

D.1.2.3. ADDITIONAL LEARNING REQUIREMENTS

Students on the programme assigned additional learning requirements (OFA). OFA are learning requirements assigned to enrolled students who have not demonstrated the full possession of the entrance requirements. The assessment methods of students' initial preparation and the fulfilment of the OFA are described in the Study Programme Regulations, and may change each year. Students not completing the additional learning requirements are obliged to re-enrol in year 1 as repeating students.

The **table** shows the number of registered students, the number of students assigned OFA, the number who fulfilled them, the percentage of students assigned the OFA compared to the number of enrolled students and the percentage fulfilling the OFA compared to those assigned them.

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

	Registered students (a)	Students assigned OFA (b)	Students who fulfilled OFA (c)	% of students assigned OFA compared to the number of enrolled students (b/a)	% of students fulfilling the OFA compared to number of students assigned (c/b)
Students 2010/2011	42	17	10	40,5%	58,8%

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)

	Registered students (a)	Students assigned OFA (b)	Students who fulfilled OFA (c)	% of students assigned OFA compared to the number of enrolled students (b/a)	% of students fulfilling the OFA compared to number of students assigned (c/b)
Students 2011/2012	55	21	14	38,2%	66,7%
Students 2012/2013	50	23			

*Note: At the time of publication of this report the number of students fulfilling the OFA can be measured for a.y. 2009/2010 and a.y. 2010/2011 only.

D.2. REGULARITY OF STUDIES

Insight into the regularity with which the students pass their exams.
Graphs and tables provide information on the number of students who leave the programme after the first year and the number of regular graduates, focusing on the number of credits obtained at the end of the first year, on the exams passed and average grade achieved for each course unit.

D.2.1. STUDENTS LEAVING THE PROGRAMME BETWEEN YEARS 1 AND 2

Here the number of students leaving the Study Programme is shown.
The **graph** shows the percentage of students who leave the programme after the first year compared to the average of similar Study Programmes (belonging to the same group).
The **table** shows the registered students, the percentage of students leaving the programme who pass to a different Study Programme in the same university, transfer to another university or withdraw from studies, as well as the enrolled repeating students and those enrolled in the second year.
The Study Programme data is compared with the average of similar Study Programmes of (which belong to the same group), for students registered in the indicated academic years.

Percentage of withdrawals between years 1 and 2

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)
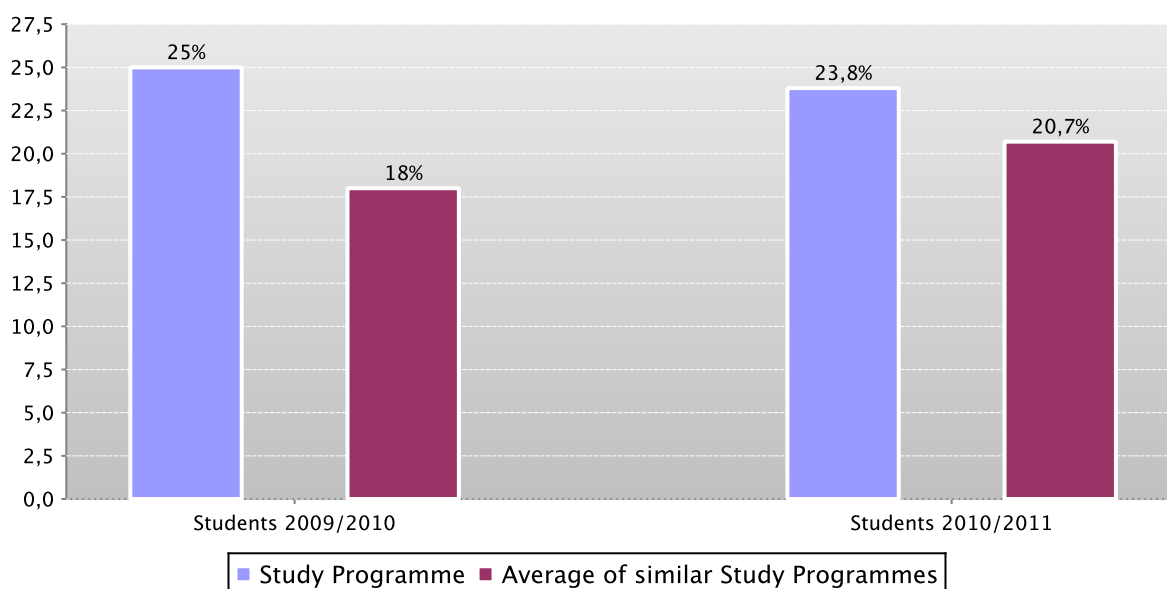
Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)
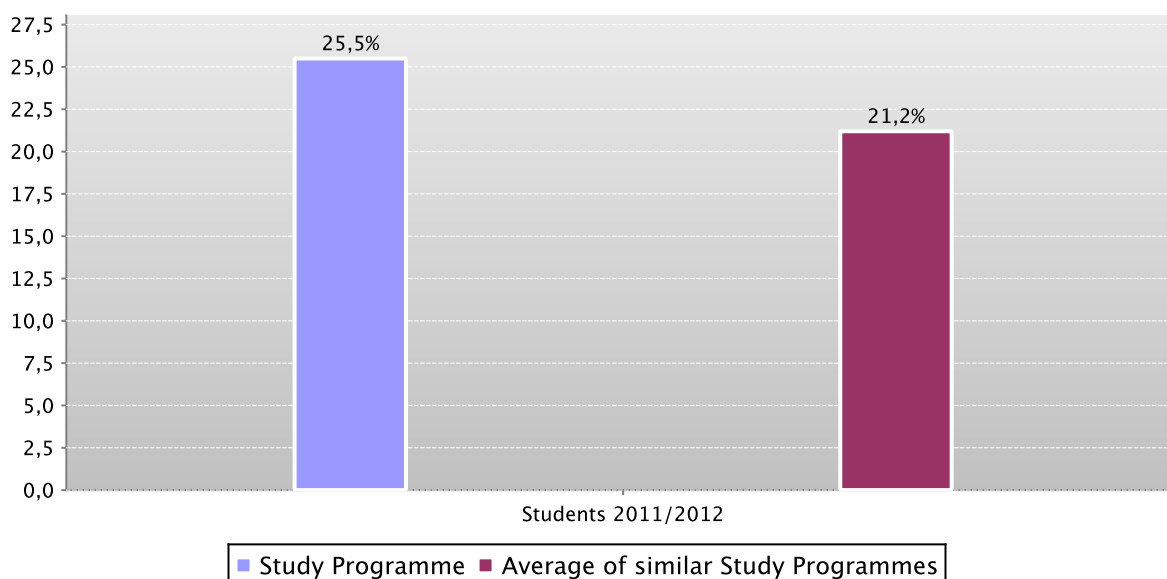
Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

		Registered students	% withdrawals	% passages and transfers	% repeating students	Students enrolled in the second year
Students 2009/2010	Study Programme	28	25,0%	3,6%	0,0%	20
	Average of similar Study Programmes	86,5	18,0%	10,4%	2,3%	59,9
Students 2010/2011	Study Programme	42	23,8%	9,5%	4,8%	26
	Average of similar Study Programmes	97,8	20,7%	12,9%	2,8%	62,2

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)

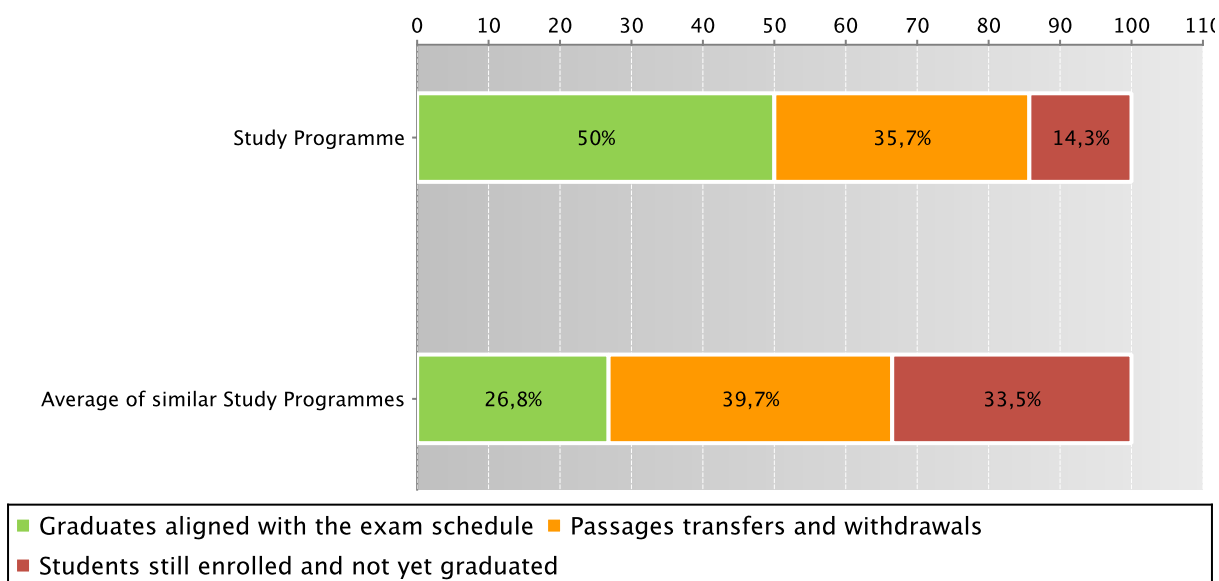|		Registered students	% withdrawals	% passages and transfers	% repeating students	Students enrolled in the second year
Students 2011/2012	Study Programme	55	25,5%	12,7%	3,6%	32
	Average of similar Study Programmes	118,6	21,2%	13,9%	2,0%	74,7

D.2.2. REGULAR GRADUATES

Here you will find information on regular graduates, on how many students, at the end of the regular programme duration, left the programme and how many are still enrolled but not aligned to the exam schedule.

The **graph** and the **table** show the situation concerning registered students for the indicated academic year, at the end of the regular duration of the Study Programme, highlighting the percentage of regular graduates, the number of students still enrolled (not aligned to the exam schedule and repeating students), students who have left the programme (including passages, transfers and withdrawals).

The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group) for students registered in the indicated academic years.

Situation of students 2009/2010 at the end of regular duration of the study programme

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

Graduates aligned with the exam schedule ▪ Passages transfers and withdrawals
▪ Students still enrolled and not yet graduated

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

		Registered students	Regular graduates		Passages transfers and withdrawals		Students still enrolled and not yet graduated	
			N.	%	N.	%	N.	%
Students 2008/2009	Study Programme	29	14	48,3%	9	31,0%	6	20,7%
	Average of similar Study Programmes	77,1	19,8	25,7%	30,5	39,6%	26,8	34,8%
Students 2009/2010	Study Programme	28	14	50,0%	10	35,7%	4	14,3%
	Average of similar Study Programmes	86,5	23,2	26,8%	34,4	39,7%	29	33,5%

See data of previous academic years – Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491) paragraph D.5.2.2.

D.2.3. ADDITIONAL DATA ON REGULARITY OF STUDIES

D.2.3.1. CREDITS OBTAINED BY STUDENTS IN THE 1ST YEAR

This offers an insight into how regularly students pass their exams.

The **graph** shows the distribution of the students according to the number of credits obtained at the end of the first year.

In addition, the **table** shows the number of students registered at the second year and average credits obtained during the first year.

The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group) for the indicated academic years.

Distribution of the students in 2011/2012 according to the number of credits obtained at the end of the first year*

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)
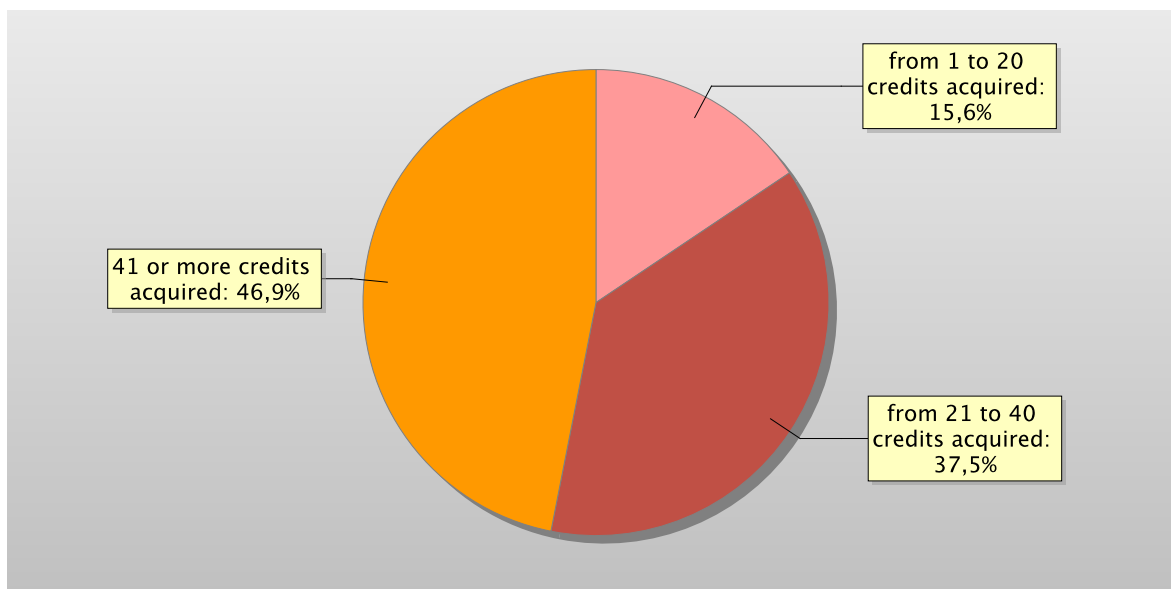
Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

			% students with *			
		Students enrolled in the 2nd year	0 credits acquired	from 1 to 20 credits acquired	from 21 to 40 credits acquired	41 or more credits acquired	Average credits per student
Students 2009/2010	Study Programme	20		5,0%	20,0%	75,0%	48,9
	Average of similar Study Programmes	59,9	4,3%	17,5%	40,5%	37,7%	33,3
Students 2010/2011	Study Programme	26		3,8%	15,4%	80,8%	46,8
	Average of similar Study Programmes	62,2	5,1%	16,9%	40,1%	37,9%	33,1

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 8514)

		Students enrolled in the 2nd year	% students with *				Average credits per student
			0 credits acquired	from 1 to 20 credits acquired	from 21 to 40 credits acquired	41 or more credits acquired	
Students 2011/2012	Study Programme	32		15,6%	37,5%	46,9%	34,8
	Average of similar Study Programmes	74,7	5,1%	16,3%	39,0%	39,7%	33,7

*Note: by convention, credits are considered to be obtained by students by 31st October of the year following the year of enrolment.

D.2.3.2. EXAMS PASSED AND AVERAGE GRADE

The **table** shows number of exams passed and average grade achieved for each course unit in the calendar year 2011. Marks for the exams passed are expressed out of thirty.

The data refers to the course unit code and therefore includes the various branches of the programme divided into channels or sub-groups, divided by letter.

It considers all subjects for which a grade is assigned, and therefore excludes all those to which a pass/fail score is allocated.

Data of the Study Programmes D.M. 270/04 Chimica e tecnologie per l'ambiente e per i materiali (code 0883), Chimica e tecnologie per l'ambiente e per i materiali (code 8514)

	N. of exams passed	Average grade *
27558 CHIMICA INORGANICA CON LABORATORIO	26	23,2
27698 MATEMATICA E CALCOLO NUMERICO L (C.I.)	2	
27703 FISICA L (C.I.)	5	
27709 CHIMICA GENERALE E INORGANICA L (C.I.)	2	
27716 CHIMICA ANALITICA L (C.I.)	28	22,3
27719 CHIMICA INORGANICA L (C.I.)	2	
27722 CHIMICA DELL'AMBIENTE L	27	25,5
27727 IMPIANTI CHIMICI L (C.I.)	13	25
27782 CORROSIONE E PROTEZIONE DEI METALLI L	14	26,9
27977 FONDAMENTI DI SCIENZA DEI POLIMERI L	26	26,4
28189 CHIMICA FISICA L (C.I.)	26	24,4
28821 CHIMICA ORGANICA L (C.I.)	11	21,7
28954 METODOLOGIE SOSTENIBILI IN CHIMICA ORGANICA L (C.I.)	18	22,6
29010 CHIMICA INDUSTRIALE E LABORATORIO L	30	25
29013 GESTIONE INTEGRATA E RICICLO DEI RIFIUTI L	23	26,9
29014 CONTROLLO INQUINANTI E MONITORAGGIO AMBIENTALE L (C.I.)	21	26,2
29096 TECNOLOGIE E PROCESSI PER L'AMBIENTE E PER L'ENERGIA L (C.I.)	28	24,7

	N. of exams passed	Average grade *
29099 ENERGIE RINNOVABILI E BIOCOMBUSTIBILI L	23	26,2
29100 ENERGETICA ELETTROCHIMICA L	13	27,1
29101 CHIMICA FISICA AMBIENTALE L	6	26,3
29102 CHIMICA INORGANICA AMBIENTALE L	14	28,6
29104 CHIMICA E TECNOLOGIA DEI POLIMERI L	10	28,3
63708 CHIMICA GENERALE E INORGANICA CON LABORATORIO	39	22,9
66682 FISICA CON ESERCITAZIONI	9	25,2
66683 CHIMICA ORGANICA I CON LABORATORIO	25	22,6
66947 MATEMATICA CON LABORATORIO DI INFORMATICA	24	22,2

* Note: no average grade is given if the number of exams passed is less than or equal to 5.

D.3. OPINIONS OF GRADUATES AND ATTENDING STUDENTS

Opinions of graduates on the Study Programme.
Tables and graphs provide information on the number of graduates who expressed positive opinions on the Study Programme, focusing on opinions expressed by attending students on course units.

D.3.1. OPINION OF GRADUATES

The **graph** shows the percentage of graduates (AlmaLaurea survey) who responded positively to the question: "**Are you generally satisfied with the Study Programme"**.
In addition, the **table** shows the percentage of students who answered "Yes, to the same programme at the university" to the question "Would you register again to the university?".
The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group), and the average of Study Programmes of the same class of other Italian universities for the graduates of the indicated years.

Graduates in 2012 who responded positively to the question: "Are you generally satisfied with this Study Programme?"

Data of the Study Programme D.M. 270/04 Chimica e tecnologie per l'ambiente e per i materiali (code 0883)
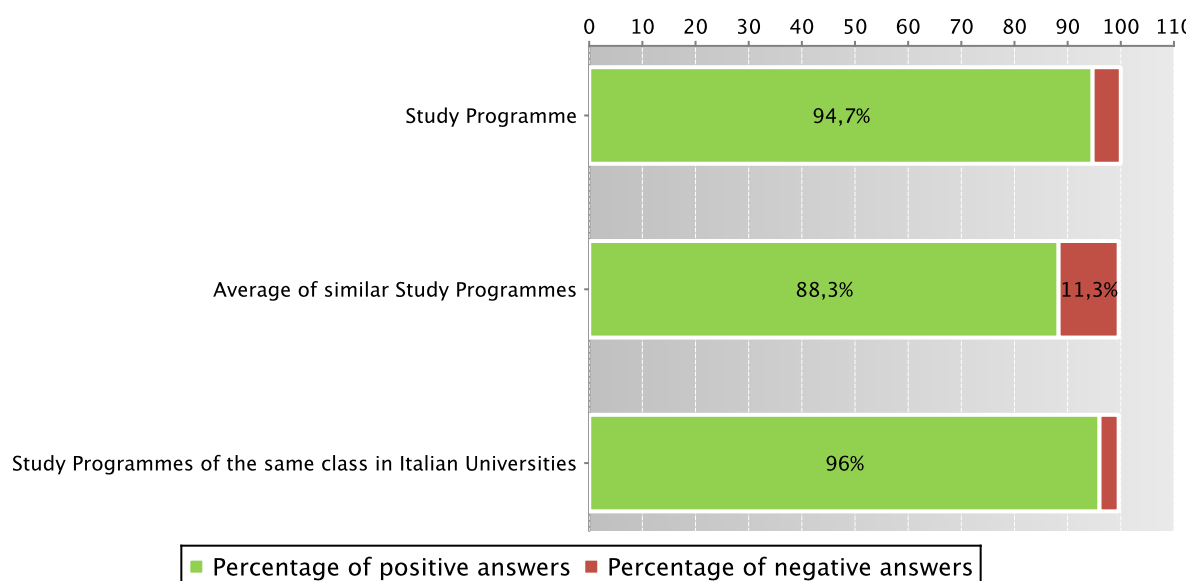
Data of the Study Programme D.M. 270/04 Chimica e tecnologie per l'ambiente e per i materiali (code 0883)

		N. graduates	Completed Questionnaires	% of positive answers to the question: "Are you generally satisfied with this Study Programme?"	% of answers "yes to the same Programme in the same University" to the question "Would you register again to the University"
2011	Study Programme	11	11	100,0%	100,0%
	Average of similar Study Programmes	23,7	22,8	88,9%	73,5%
	Study Programmes of the same class in Italian Universities	291	286	93,4%	82,9%
2012	Study Programme	19	19	94,7%	84,2%
	Average of similar Study Programmes	24,4	23,9	88,3%	72,3%
	Study Programmes of the same class in Italian Universities	547	525	96,0%	83,8%

Symbols:

(*) The opinions of the Study Programmes with less than 5 graduates are not shown.

Further information on Graduates' Profile Report.

See data of previous academic years – Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491) paragraph D.5.3.1.

D.3.2 ADDITIONAL DATA ON OPINIONS OF STUDENTS

D.3.2.1. OPINION OF ATTENDING STUDENTS

The **graph** shows the percentage of attending students who responded positively to the question in the questionnaire: "Are you generally satisfied with this course unit?" in academic year 2011/2012.

The **table** also shows the number of completed questionnaires.

The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group), for the indicated academic years.

The data concerning the students' opinion refers to the opinions of those attending lessons, whether they are enrolled in the current programme or a Study Programme running under pre-reform regulations (under D.M. 509).

For the University of Bologna the survey and subsequently analysis of the opinions of students attending the course is cared by Academic Affairs Division - Quality Assurance Department and Control and Finance Division - Support Planning and Evaluation Department. The overall results and the methods of collection and analysis are described in the document published online on the Statistical Observatory of the University of Bologna (see the note in the glossary).

Students who responded positively to the question: "Are you generally satisfied with this course unit?" in academic year 2011/2012

Data of the Study Programmes D.M. 270/04 Chimica e tecnologie per l'ambiente e per i materiali (code 0883), Chimica e tecnologie per l'ambiente e per i materiali (code 8514) and of the Study Programme D.M. 509/99 Tecnologie chimiche per l'ambiente e per la gestione dei rifiuti (code 0491)
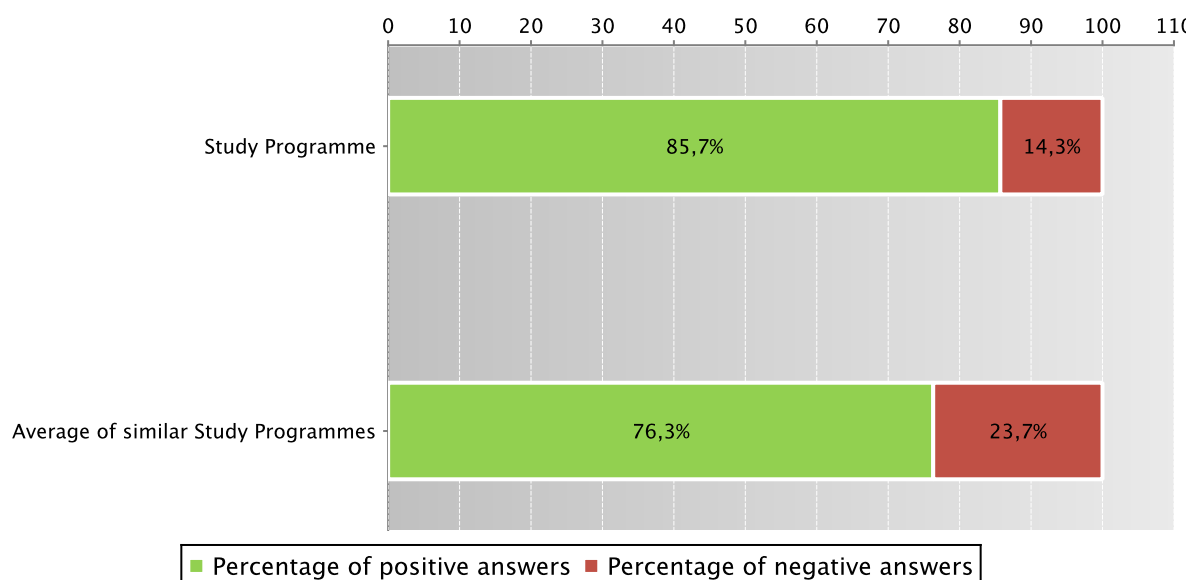
Data of the Study Programmes D.M. 270/04 Chimica e tecnologie per l'ambiente e per i materiali (code 0883), Chimica e tecnologie per l'ambiente e per i materiali (code 8514) and of the Study Programme D.M. 509/99 Tecnologie chimiche per l'ambiente e per la gestione dei rifiuti (code 0491)

		Number of completed questionnaires	% of positive answers concerning the general satisfaction with the course unit – Question 19
a.y. 2009/2010	Study Programme	728	76,1%
	Average of similar Study Programmes	1006,2	75,2%
a.y. 2010/2011	Study Programme	656	78,5%
	Average of similar Study Programmes	1038	75,4%
a.y. 2011/2012	Study Programme	755	85,7%
	Average of similar Study Programmes	1243	76,3%

Symbols:

(*) When there is a small number of questionnaires, the percentage of positive opinions on overall satisfaction is not presented.

Further information on Rapporto Opinione degli studenti frequentanti sulle attività didattiche (the content is in Italian).

D.4. ENTRY INTO THE WORLD OF WORK

Employment situation of graduates of the Study Programme.
Tables and graphs provide information on the employment situation of graduates one year after graduating.

D.4.1. EMPLOYMENT SITUATION

Employment situation of graduates in 2011 one year after graduating

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)

Data of the Study Programme D.M. 270/04 Chemistry and Technologies for the Environment and Materials (code 0883)
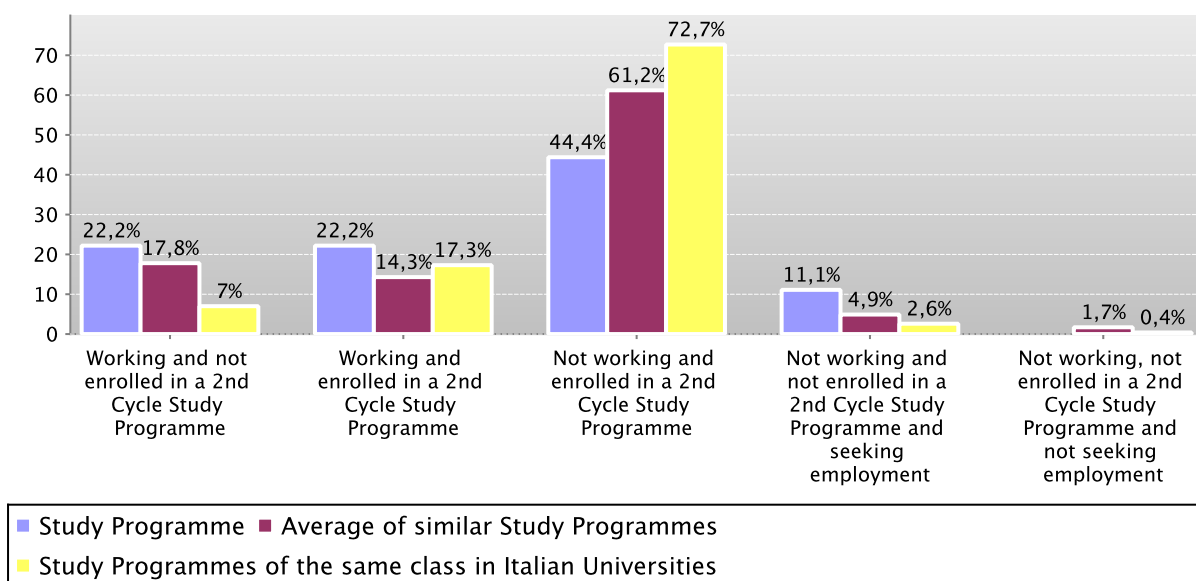
| | | N. graduates interviewed | Employment and education situation (1) | | | | | | Degree's appropriateness for the job (referred to the graduates who just work) (3) | |
			Working and not enrolled in a 2nd Cycle Study Programme	Working and enrolled in a 2nd Cycle Study Programme	Not working and enrolled in a 2nd Cycle Study Programme	Not working, not enrolled in a 2nd Cycle Study Programme and not seeking employment	Not working and not enrolled in a 2nd Cycle Study Programme and seeking employment	Not working, not seeking employment, but following a university programme/traineeship (2)	Effective / very effective	Quite effective
Graduation Year 2011	Study Programme	9	22,2%	22,2%	44,4%		11,1%	33,3%		
	Average of similar Study Programmes	21,7	17,8%	14,3%	61,2%	1,7%	4,9%	55,2%	33,5%	26,0%
	Study Programmes of the same class in Italian Universities	271	7,0%	17,3%	72,7%	0,4%	2,6%	66,8%	22,7%	25,8%

See data of previous academic years – Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491) paragraph D.5.4.1.

D.5. INFORMATION ON PRE-REFORM PROGRAMMES (DM 509/99)

D.5.1. STUDENTS STARTING THEIR UNIVERSITY CAREERS

Characteristics of incoming students at the beginning of their university careers. Tables and graphs provide information on the number of registered students, focusing on the characteristics of the students, results of any entrance tests and students assigned additional learning requirements.

D.5.1.1. ENROLMENTS AND REGISTRATIONS

Data of enrolments and registrations of the last three academic years are shown in paragraph D.1.1.

D.5.1.2. ADDITIONAL DATA ON STUDENTS' STARTING THEIR UNIVERSITY CAREERS

D.5.1.2.1. CANDIDATES REGISTERED FOR THE ENTRANCE EXAM

Data of candidates registered for the entrance exam are shown in paragraph D.1.2.1.

D.5.1.2.2. INCOMING STUDENTS

Data of incoming students of the last three academic years are shown in paragraph D.1.2.2.

D.5.2. REGULARITY OF STUDIES

Insight into the regularity with which the students pass their exams.
Graphs and tables provide information on the number of students who leave the programme after the first year and the number of regular graduates, focusing on the number of credits obtained at the end of the first year, the number of exams passed and the average grade achieved for each course unit.

D.5.2.1. STUDENTS LEAVING THE PROGRAMME BETWEEN YEARS 1 AND 2

Data of students leaving the Study Programme of the last three academic years are shown in paragraph D.2.1.
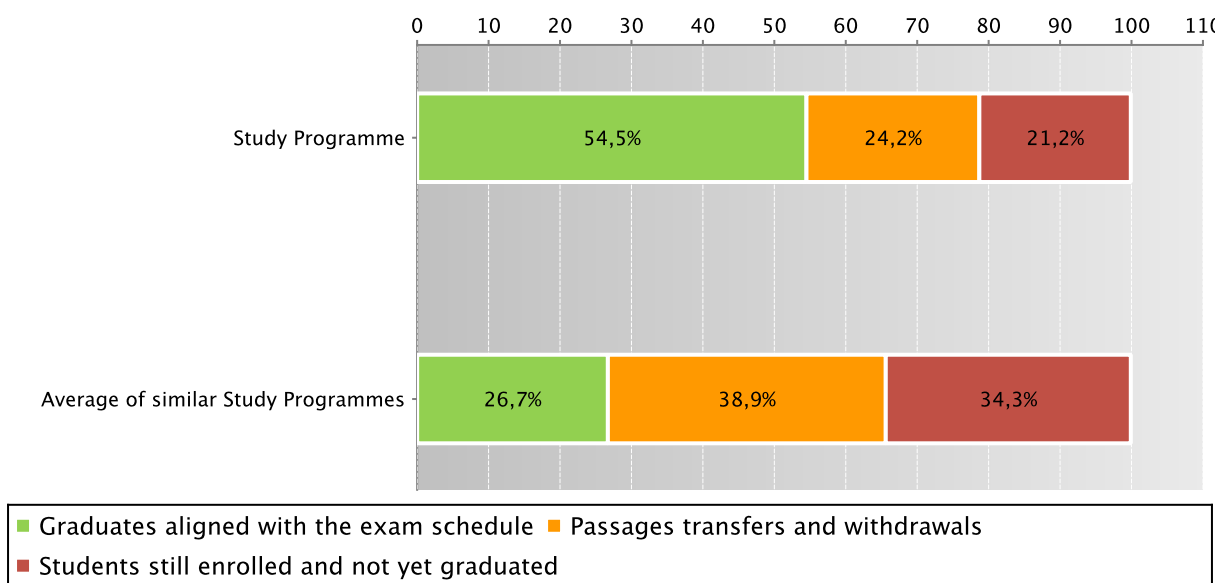
D.5.2.2. REGULAR GRADUATES

Here you will find information on regular graduates, on how many students, at the end of the regular programme duration, left the programme and how many are still enrolled but not aligned to the exam schedule.

The **graph** and the **table** show the situation concerning registered students for the indicated academic year, at the end of the regular duration of the Study Programme, highlighting the percentage of regular graduates, the number of students still enrolled (not aligned to the exam schedule and repeating students), students who have left the programme (including passages, transfers and withdrawals).

The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group) for students registered in the indicated academic years.

Situation of students 2007/2008 at the end of regular duration of the study programme

Data of the Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491)

■ Graduates aligned with the exam schedule   ■ Passages transfers and withdrawals
■ Students still enrolled and not yet graduated

Data of the Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491)

		Registered students	Regular graduates		Passages transfers and withdrawals		Students still enrolled and not yet graduated	
			N.	%	N.	%	N.	%
Students 2007/2008	Study Programme	33	18	54,5%	8	24,2%	7	21,2%
	Average of similar Study Programmes	72,8	19,5	26,7%	28,4	38,9%	25	34,3%

Go back to D.2.2. Regular graduates

D.5.2.3. ADDITIONAL DATA ON REGULARITY OF STUDIES

D.5.2.3.1. CREDITS OBTAINED BY STUDENTS IN THE 1ST YEAR

Data of credits obtained by students in the 1st year of the last three academic years are shown in paragraph D.2.3.1.

D.5.2.3.2. EXAMS PASSED AND AVERAGE GRADE

Data of exams passed and average grade are shown in paragraph D.2.3.2.

D.5.3. OPINIONS OF ATTENDING STUDENTS AND GRADUATES

Opinions of graduates on the Study Programme.
Tables and graphs provide information on the number of graduates who expressed positive opinions on the Study Programme, focusing on opinions expressed by attending students on course units.

D.5.3.1. OPINION OF GRADUATES

The **graph** shows the percentage of graduates (AlmaLaurea survey) who responded positively to the question: "**Are you generally satisfied with the Study Programme**".

In addition, the **table** shows the percentage of students who answered "Yes, to the same programme at the university" to the question "Would you register again to the university?".

The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group), for the indicated years.

Graduates in 2010 who responded positively to the question: "Are you generally satisfied with this Study Programme?"

Data of the Study Programme D.M. 509/99 Tecnologie chimiche per l'ambiente e per la gestione dei rifiuti (code 0491)
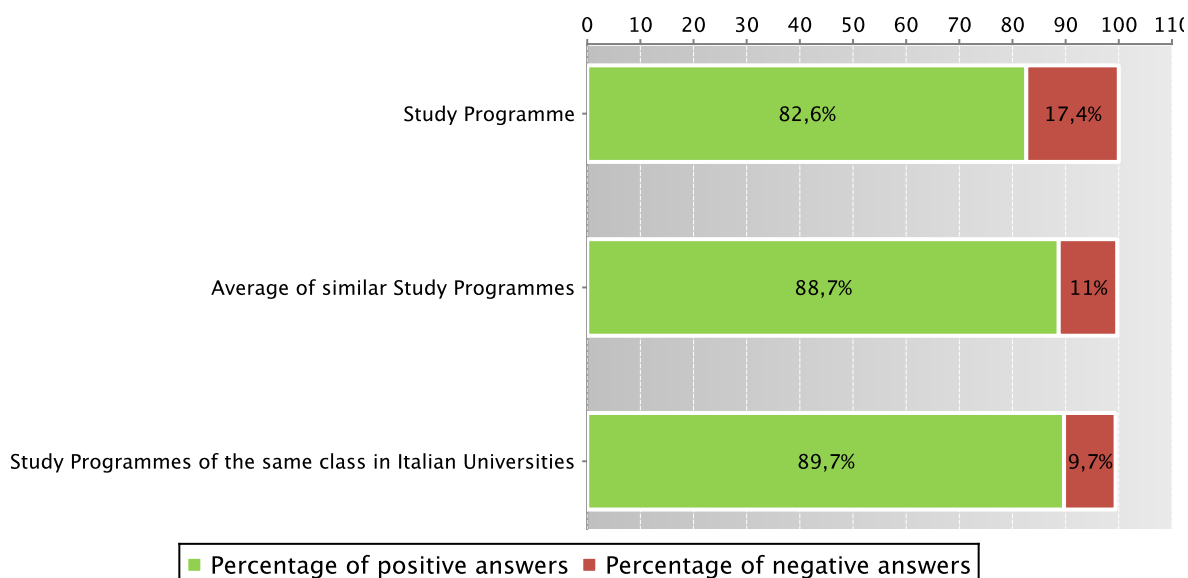
Data of the Study Programme D.M. 509/99 Tecnologie chimiche per l'ambiente e per la gestione dei rifiuti (code 0491)

		N. graduates	Completed Questionnaires	% of positive answers to the question: "Are you generally satisfied with this Study Programme?"	% of answers "yes to the same Programme in the same University" to the question "Would you register again to the University?"
2010	Study Programme	23	23	82,6%	60,9%
	Average of similar Study Programmes	44,6	43,4	88,7%	72,5%
	Study Programmes of the same class in Italian Universities	902	860	89,7%	74,3%

Symbols:
(*) The opinions of the Study Programmes with less than 5 graduates are not shown.
Further information on Graduates' Profile Report.
Go back to D.3.1. Opinion of graduates

D.5.3.2 ADDITIONAL DATA ON OPINIONS OF STUDENTS

D.5.3.2.1. OPINION OF ATTENDING STUDENTS

Data of opinion of attending students of the last three academic years are shown in paragraph D.3.2.1.

D.5.4. ENTRY INTO THE WORLD OF WORK

Employment situation of graduates of the Study Programme.
Tables and graphs provide information on the employment situation of graduates one year after graduating.

D.5.4.1. EMPLOYMENT SITUATION

The paragraph shows the employment situation of graduates one year after graduating.
The data is taken from the AlmaLaurea reports on the employment situation of graduates.
The **graph** shows who is working, who is not working but has enrolled in a Second Cycle study programme, who is not working and is not seeking employment, who is not working but is seeking employment.
In addition, the **table** shows the number of graduates interviewed, the number involved in internships and traineeships and the appropriateness of their degree to the job.
The Study Programme data is compared with the average of similar Study Programmes (which belong to the same group) and the average of Study Programmes of the same faculty of other Italian universities for the graduates of the indicated years.

Employment situation of graduates in 2010 one year after graduating

Data of the Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491)

Legend:
■ Study Programme   ■ Average of similar Study Programmes
■ Study Programmes of the same class in Italian Universities

Data of the Study Programme D.M. 509/99 Chemical Technologies for the Environment and Waste Management (code 0491)
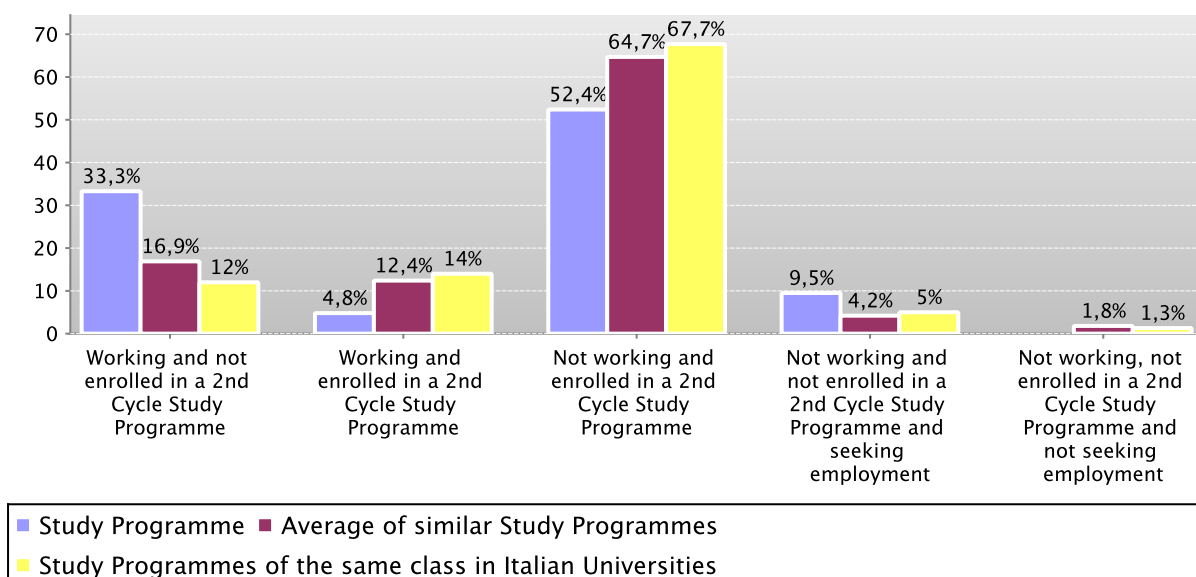
		N. graduates interviewed	Employment and education situation (1)					Not working, not seeking employment, but following a university programme/traineeship (2)	Degree's appropriateness for the job (referred to the graduates who just work) (3)	
			Working and not enrolled in a 2nd Cycle Study Programme	Working and enrolled in a 2nd Cycle Study Programme	Not working and enrolled in a 2nd Cycle Study Programme	Not working, not enrolled in a 2nd Cycle Study Programme and not seeking employment	Not working and not enrolled in a 2nd Cycle Study Programme and seeking employment		Effective / very effective	Quite effective
Graduation Year 2009	Study Programme	16	12,5%	12,5%	50,0%	12,5%	12,5%	37,5%	25,0%	25,0%
	Average of similar Study Programmes	43,1	19,0%	11,8%	62,8%	1,9%	4,5%	58,0%	34,5%	32,8%
	Study Programmes of the same class in Italian Universities	823	11,3%	14,8%	67,1%	2,2%	4,6%	58,3%	28,4%	27,5%
Graduation Year 2010	Study Programme	21	33,3%	4,8%	52,4%		9,5%	42,9%	50,0%	25,0%
	Average of similar Study Programmes	40,6	16,9%	12,4%	64,7%	1,8%	4,2%	59,0%	30,8%	34,6%
	Study Programmes of the same class in Italian Universities	847	12,0%	14,0%	67,7%	1,3%	5,0%	56,6%	25,6%	23,3%

Symbols:

(*) The opinions of the Study Programmes with less than 5 graduates are not shown.

Notes on the AlmaLaurea report on the employment situation of graduates

(1) "Employment and education situation": the number of employed graduates is the sum of those working and those working who are also enrolled in a 2nd cycle degree programme. The number of those enrolled in a 2nd cycle degree programme is the sum of those who are working and studying and those who are only studying.

(2) "Number of those who do not work, who are not seeking employment but who are following a university programme/traineeship": the definition includes those who are enrolled in traineeships, PhD degrees, specialisation schools, Italian "master universitari"(first and second level). The presentation of this data complies with article 2 of D.M. 544 of 31st October 2007, as later provided for in Management Decree no. 61 of 10th June 2008 (transparency requirements).

(3) The evaluation of the appropriateness of the degree is obtained by a combination of the requirement of the relative qualification for the job held and the level of usage of the skills learned at university.

Further information on Graduates' Employment report.

Go back to D.4.1. Employment situation

E. FIND OUT MORE: THE QUALITY OF YOUR STUDY PROGRAMME

The University of Bologna has identified its objectives as the *personal, cultural and professional growth of students and the improvement of the quality of learning, also in relation to the needs of society* (Strategic Plan 2010-2013).

Students, employers and society as a whole, have the right to effective learning for individual and intellectual growth, to develop critical sense and to prepare for the world of work.

In the Statute and the Strategic Plan 2010-2013 the University of Bologna acknowledges its responsibility in guaranteeing the quality of its study programmes, and for this purpose adopts an "internal quality assurance system".

The Internal Quality Assurance system

The internal quality assurance system is a set of processes and responsibilities adopted to guarantee the quality of Study Programmes at the University of Bologna.

The guarantee of the quality of a Study Programme is the correspondence of the results achieved with the set objectives, in the following phases:

- Plan: defining the objectives
- Do: implementing the planned actions
- Check: checking that the objectives have been achieved
- Act: planning improvement action
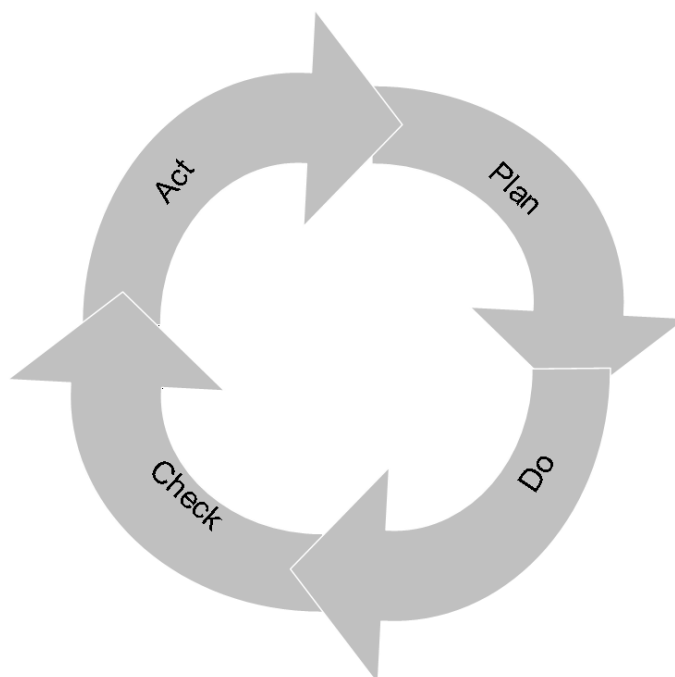
This path responds to the expectations of students, guides teaching behaviour and provides indicators for the assessment of results. Self-assessment is based on the analysis of significant data (for example, the number of students graduating in line with the exam schedule, students' opinions and the employment rates of graduates) and highlights strengths and weaknesses in order to reflect on the achieved results, critically consider one's own working methods and take steps for the continual improvement of the Programme. This path involves all educational stakeholders, including students, in order to make use of the contributions of everyone with first-hand knowledge of the Study Programme. Improvement is therefore a day to day development, concerning all aspects of teaching: from the lesson timetable to the publication of on-line programmes, from classroom management to exam methods, and the actual design of the Programme.

This is what happens in each phase:

- **Planning**: the Study Programme is the result of a proposal from the teaching structures and approved by the Academic Bodies.
- **Management**: Schools, Departments and Study Programmes manage the activities required to ensure teaching. The activities are organised as follows**:**

What we do	Who does what				
	Professors	**Study Programme**	**Schools**	**Departments**	**General Administration**
Teaching calendar, lessons programme and exam schedules			x		
Management of financial resources			x	x	
Classroom teaching	x				
Management of classrooms and laboratories			x	x	
Libraries and study rooms			x	x	
Approval of individual study plans		x			
Communication and information		x	x		Academic Affairs Division
Guidance service		x	x		Academic Affairs Division
Internships		x	x		Academic Affairs Division
Administrative services: Student Administration Office					Academic Affairs Division
Administration services: Degree programme office			x		Academic Affairs Division
Study grants and loans ad honorem					Academic Affairs Division
Student mobility: university subsidies and programmes					International Relations Division
Mobility: study grants for dissertations abroad			x		
Mobility: authorisations and recognitions		x			
Other students support services		x	x		x

- **Internal assessment:** every Study Programme periodically assesses its own results, evaluating, for example, the number of enrolled students, the number of withdrawing students, student opinions etc.; in this way, the strengths and weaknesses, as well as any implemented improvement actions, are highlighted. This phase is organised as follows:

What we do	**Who does what**
Definition, gathering and publication of evaluation data According to the general guidelines of the University and national and international standards, are defined the tools through which should be evaluated the results (indicators). The survey data to be evaluate are published every year on the Report of the Study Program.	Academic Bodies
Self-Assessment The Schools and Study Programmes assess the effectiveness of the previously adopted solutions, analyse the progress of their learning activities and draw up proposals for improvement.	Schools and Study Programmes

Internal audit

The results of the self-assessment process are reviewed in the following phases:

- Analysis: the University Quality Manager analyses the review documents, considering the ability to identify problems, propose solutions and the overall development of the internal quality assurance system.

- Review: The observations on the results obtained and the good practices adopted are examined together with the persons in charge of the Schools and Study Programmes in meetings organised by scientific-disciplinary field. The persons in charge receive the observations and inputs on the areas for development and the actions to be adopted in future to improve results.

- Sharing: the conclusions of the review activities are submitted to the Academic Bodies and the University Evaluation Board.

Quality Manager

Vice Rector for Teaching and Education

Academic Bodies

- **Improvement**: on the basis of the results of the internal audit, the Schools and Study Programmes plan improvement activities, to ensure that the Study Programmes increasingly respond to the needs of society. The cycle then starts over again, with the definition of actions to be implemented, the results of which are in turn verified, in a continuous path that guarantees the quality of education.

F. GLOSSARY TERMS

Additional Learning Requirements

Students enrolling in the first year of a first cycle or single cycle degree and who, following the results of the entrance exams established for each study programme, do not possess the knowledge required for access to the programme, are assigned additional learning requirements (OFA).

The OFA are fulfilled by passing an assessment test defined by the programme.

The non-fulfilment of the requirements by the date set by the Academic Bodies and published on the University Portal will lead to the re-enrolment in the first year of the programme.

AlmaLaurea

AlmaLaurea is an innovative in-line database service of graduates' curriculum vitae (1,620,000 CVs, from 53 Italian universities as of 05/07/2012), which offers a link between graduates, universities and businesses.

Created in 1994 on the initiative of the Statistical Observatory of the University of Bologna, managed by a consortium of Italian universities with the support of the Ministry of Education, University and Research, the purpose AlmaLaurea is to act as a point of contact between businesses and graduates, a reference within universities for anyone (students, businesses, etc...) working in the field of university studies, employment and the condition of young people at different levels.

Average of similar study programmes (belonging to the same group)

Average of the Study Programmes (which belong to the subject group)

Calculated average which refers to all study programmes of the same cycle which belong to the subject group.

There are four groups, composed as follows:

- BIOMEDICAL group: Study Programmes of the Schools of Pharmacy, Biotechnology and Sport Science; Medicine; Agriculture and Veterinary Medicine

- SCIENTIFIC-TECHNOLOGICAL group: Study Programmes of the Schools of Engineering and Architecture; Sciences

- SOCIAL SCIENCES group: Study Programmes of the Schools of Economics, Management, and Statistics; Law, Political Sciences

- HUMANITIES group: Study Programmes of the Schools of Arts, Humanities, and Cultural Heritage; Foreign Languages and Literatures, Interpreting and Translation; Psychology and Education

CFU University Learning Credits

University Learning Credits (CFU) were introduced under Italian Ministerial Decree no. 509/99 to comply with European legislation, and are a measurement of the volume of learning, including individual study, required of students; generally 1 CFU corresponds to 25 hours of a student's "overall learning effort".

Class

Degree classes group together study programmes of the same level and with the same key learning outcomes and available learning activities for a given number of credits and in sectors which are identified as indispensable. The features of the classes are set nationally, by Ministerial Decree, and are therefore common to all universities.

Cohort

Cohort refers to a group of students enrolled in the same academic year.

Enrolment status

In terms of enrolment, students may be:

- **Regularly enrolled**: students enrolled for as many or fewer years than the legal duration of the study programme, who do not fall into any of the following categories;

- **Not aligned with the exam schedule**: students who, without having graduated, have enrolled in all the years of the study programme and which, for programmes with compulsory attendance, have obtained all attendance certificates;

- **Repeating**: students re-enrolling in the same year of a programme again. Starting from academic year 2009-2010, students who have not fulfilled the assigned additional learning requirements within the deadline have to enrol in the 1st year as repeating students.

Entrance exam

Enrolment in a study programme may be free access or restricted access.

For all programmes with restricted access, candidates are required to sit an entrance exam and there are a limited number of places available. The entrance exam is a test which is used to draw up a graded list of candidates; students may enrol in the programme according to their place in the list. The methods of managing the call for applications and the list of candidates, including the methods for filling any unclaimed places, may vary from year to year. The test may be specific to a Degree Programme or may be part of a single exam covering several programmes from the same university or from other universities (during the registration the students should indicate their first choice).

The following definitions apply:

Available places = the number of places laid down in the call for applications to the Study Programme, or determined by subsequent legal provisions; these exclude any additional places reserved according to special provisions of the programme (e.g. for international study programmes, they do not include places for foreign students selected from other universities; for all programmes with restricted access regulated nationally, these do not include the places reserved for transferring students).

Number of candidates for the exam = number of students registered for the exam indicating the study programme as their first choice;

Number of participants in the exam = number of students participating in the exam indicating the study programme as their first choice;

Number of participants in the exam for every available place = number of students participating in the exam who indicated the study programme as their first choice as a ratio of the number of places available on the programme.

First year enrolments

This includes all students enrolled in the first year, including those joining the study programme in its first year through transferrals, as well as those enrolled in the first year but not for the first time (e.g. repeating students).

New Careers

Students who start a new university career (excluding transfers) from year one in a second cycle programme.

Passages and transfers

Passage: when a student applies to move to a different study programme from the one enrolled in the previous year, within the same university.

Transfer: when a student transfers from a study programme in one university to any programme in another university.

Registered students

Students who begin a career in the Italian University System for the first time and who enrol in the first year (i.e. for whom no previous university careers are recorded) of a First Cycle (L509, L) or Single Cycle programme (LSCU, LMCU)

Statistical Observatory of the University of Bologna

The Statistical Observatory was founded in 1997 in order to "provide the university governing bodies with a reliable and timely documentary and monitoring database aiming to promote decision-making processes and planning, particularly of learning activities and other services targeting the student population" (art.1 of the Founding and Operational Regulation). Following the disabling of the Statistical Observatory, as resolved by the Board of Governors on 14 December 2010, from the second semester of academic year 2010-11 the survey and subsequently analysis of the attending students opinion is cared for the University of Bologna by Academic Affairs Division - Quality Assurance Department and Control and Finance Division - Support Planning and Evaluation Department. The overall results and the methods of collection and analysis are described in the document published online on the Statistical Observatory of the University of Bologna.

University DataWarehouse

In information service for the managers of the University of Bologna organisational departments which gathers, integrates and reorganises data from various sources and makes it available for analysis and evaluation for the purposes of planning and decision-making.

Withdrawal

Suspension of studies by students who do not register in the next academic year, or who drop out from the degree programme.