UNIVERSITÀ DEGLI STUDI DI MESSINA
CORSO DI LAUREA MAGISTRALE IN CHIMICA E TECNOLOGIA FARMACEUTICHE

MASTER DEGREE COURSE IN PHARMACEUTICAL CHEMISTRY AND TECHNOLOGY RULES

Clause 1

Name, class membership, qualifying educational goals, lenght, job opportunities.

According to DM270/04 is instituted at the Department of Pharmaceutical Sciences and Health Products, University of Messina, the 2nd Degree in Pharmaceutical Chemistry and Technology or Master Degree in Pharmaceutical Chemistry and Technology (ECTS) following transformation of the 2nd Degree Course in Pharmaceutical Chemistry and Technology (DM509/99).

The Master Degree at one cycle in Pharmaceutical Chemistry and Technology belongs to the Class LM-13 Master Degrees at one cycle in Pharmacy and Industrial Pharmacy and has the objective of ensuring the graduates the scientific and theoretical and practical preparation necessary to practice as a pharmacist and to act as expert in drug and health products, its field industry.

By obtaining the master degree and related professional qualification, a graduate of the class exercises under the Directive 85/432/EEC, the profession of pharmacist in Europe. The Master Degree in Pharmaceutical Chemistry and Technology may also access the state examinations for entry to the Section A of the Chemists Register(D.P.R. June 5 2001 n.328).

The duration of the Master Degree Course in Pharmaceutical Chemistry and Technology is five academic years, including a period of professional training in a pharmacy open to the public, or in a hospital under the supervision of pharmaceutical services for 30 university educational credits (CFU) and a graduation thesis for 20 credits.

Clause 2

Overview of activities, educational goals and learning outcomes expected

The curriculum includes activities provided by the Class of Master Degree in Pharmacy and Industrial Pharmacy (LM-13), including practical laboratory and external activities. The fraction of total time commitment given to education or other training-type individual activities is superior to 60%.

For obtaining the Master Degree in Pharmaceutical Chemistry and Technology, the student must have acquired 300 credits distributed in 60 credits per academic year, and have passed a final examination in accordance with Clause 7 of this Regulations.

The curriculum of the Master Degree course in Pharmaceutical Chemistry and Technology, while pursuing the qualifying common educational goals set for Graduates of the Class LM/13- Pharmacy and Industrial Pharmacy, is divided into several interconnected educational moments, in order to acquire the knowledge and multidisciplinary skills to graduate, that are essential for access to the pharmaceutical profession, preferentially in the industry. Specifically, all the training provided is designed to provide graduate: multi-core knowledge and competences for the understanding of the drugs, their structures and activities in relation to their interaction with biomolecules in cellular and systemic level; the skills needed in the preparation and monitoring of medicines; chemical, biology and medicine knowledge, integrated with each other, as well as those relating to national and EU laws governing the various activities of the sector, characteristics of a professional who, in the context of medicines and health products in general, can ensure the safety, quality and efficacy, as required by the regulations of WHO and by national and European level; the acquisition of the scientific method of investigation applied in particular to the fileds of the pharmaceutical industry; the knowledge of at least one European Union language, besides Italian, with reference to disciplinary vocabularies. Therefore, the framework of training provides the knowledge of the elements of mathematics, statistics, computer science and physics, finalized at learning of the course disciplines. In the first two years, students must learn in the training base on the chemical disciplines: general chemistry and inorganic chemistry, the fundamental principles of organic chemistry, the chemistry of functional groups and stereochemistry, the fundamentals of analytical chemistry. As part of the training activities related to the basic bio-medical disciplines, the student must know: the biology of the animal cell; the morphology of the human body in relation to anatomical and medical terminology; the general and applied biochemistry, for understanding of the molecules of biological interest, the mechanisms of metabolic and molecular mechanisms of biological phenomena in relation to the next study the effectiveness of drugs;

the physiology of the report life and the vegetative life of man; the elements of microbiology useful for understanding the infectious diseases, their treatment and tests for microbiological control; the principles of etiopathogenesis and denomination of human diseases, with knowledge of medical terminology. Knowledge of elements of physical chemistry and physical methods in organic chemistry will complement the knowledge base common to the class of Master Degree LM-13. This knowledge, gained primarily in two years, will be useful in acquiring the knowledge and skills relating to: a) the medicinal chemistry, the design and syngraduation thesis of major classes of drugs, their physical-chemical properties, their mechanism of action, and relations structure - activity, b) raw materials, whether of natural origin, used in formulations of therapeutic preparations, c) plants as sources renewable biological and biotechnological of drugs, and their importance in cycle of industrial production of medicines; d) the chemical analysis of drugs, even in no simple matrices of natural origin, e) the preparation of various pharmaceutical forms as galenical and as medicinal product; f) knowledge of basic and advanced pharmaceutical technology with particular emphasis to industrial production cycles, production equipment and quality control of medicines; g) foods, dietary and nutritional, cosmetic, diagnostic and clinical-chemical, and medical-surgical principals and their techniques of production; h) pharmacology, toxicology and pharmacotherapy, in order to complete a knowledge of drugs and of issues relating to their administration, metabolism, action, toxicity and interactions; i) the laws and ethics required for the different aspects of professional activity. To ensure that the knowledge will be integrated among themselves becoming specific expertise, specific and characteristic of the graduate in Pharmaceutical Chemistry and Technology, are expected to require in specific specific disciplines characterize, practical activities in laboratories with high-tech science. The knowledge and skills acquired will be consolidated in compliance with European directives through outside activities such as professional internships at pharmacies open to the public, or in hospitals under the supervision of pharmaceutical services, not less than 30 CFU, and periods of study abroad seconds international agreements or conventions established by the University.

The curriculum of the Master Degree in Pharmaceutical Chemistry and Technology respects the European Union directives that put clauses determinants for recognition of title in the EU, expected laboratory practice in the various disciplines, and in relation to specific objectives, activities external internships at public or private facilities, and periods of study abroad second international agreements or conventions adopted by Universities.

Therefore, the expected learning outcomes, expressed through the *European Descriptors Degree* (DM 16/03/2007, Clauses 3, 7) are:

Knowledge and understanding. Graduates of the Master Degree in Pharmaceutical Chemistry and Technology must know and understand the subjects peculiar to physics, chemistry, medicinal chemistry, biology, pharmaceutical biology, pharmacology, medical disciplines, pharmaceutical technology and legislation, to the extent which they contribute to inter-and multidisciplinary approach of a practitioner able, by consulting the scientific literature, to learn advanced topics critically about the problems associated with the development, use and control of drugs and to develop and / or apply to ideas, procedures and / or methodologies in the context of pharmaceutical basic and applied research. The target course is therefore aimed at providing the graduate solid cultural helpful for addressing the third cycle of university studies or the inclusion in the pharmaceutical profession (public pharmacy/ pharmaceutical industry). The teaching tools of choice for the development of the knowledge and skills are lectures and theoretical practices held by professors, supported by an excellent and effective tutoring activities in progress. Sequencing and correlation between knowledge of the basic, characterizing and affine disciplines are the basis for the modular training plan and then achieve the expected learning outcomes, which are verified through oral or/ and written examinations.

Applying knowledge and understanding. Graduates of the Master Degree in Pharmaceutical Chemistry and Technology, considering the wealth of skills and knowledge acquired in biological, chemical, medical, pharmaceutical and legal filed, must be able to face the entire sequence of the complex multidisciplinary process from design structure, leads to the production and quality control and stability of the drug, according to the rules codified in Pharmacopoeias in the pharmaceutical industry. The graduates, according to Directive 85/432/EEC must also be able to make galenicals and dispense medicines in pharmacies open to the public and hospital pharmacies, and must possess the skills to facilitate professional service within the national health service, and those required to interact with other health professions.

Graduates will also be able to conceive, propose, support and conduct arguments and projects concerning the problems of the drug as well as to compete successfully with interdisciplinary topics related to these in the field of pharmaceutical basic or applied research (in contexts public or private). The capabilities described above will be given through proper organization of the training activities that will be geared to translate, even for the basic disciplines, the theoretical acquisitions in operational capabilities, and sequentially modulated in such a way that the knowledge will be integrated with each other becoming specific skills, peculiar and characteristic the professional profile of a degree in Pharmaceutical Chemistry and Technology. Therefore, the teaching tools used to achieve these objectives include, in parallel with

lectures, laboratory activities, also as practical exercises to place individual under the guidance of a professor with the assistance of qualified tutors. The oral or/ and written examinations represent the tool for verification of the results expected.

Making judgments. Graduates of the Master Degree in Pharmaceutical Chemistry and Technology, acquire, by learning critical or supported by experimental evidence from the scientific literature and the proper balance of training activities in theoretical and practical-experimental, the ability to collect, process and interpret scientific data, bibliographic and / or experimental, associated with several issues in the pharmaceutical industry. The experimental nature of the final stimulates and strengthens the ability to conduct original projects by managing the scientific, organizational complexity increasing job skills and personal propensity for teamwork. The multidisciplinary cultural background and propensity drawing criticism put graduates are able to formulate and propose independent reflections not only on scientific and technical issues but also on social and ethical issues related to the use of drugs. The teaching tools identified to achieve this goal consists in performing exercises individual and / or group and implementation of a research project subject of the Master thesis, the evaluation of which, as regards the originality of the topic, the methodological rigor and scientific correctness of exposure, contributes to verify the achievement of the expected results.

Communication skills. Graduates of the Master Degree in Pharmaceutical Chemistry and Technology acquire communicative skills related issues and problems of their profession through the custom to break down and reassemble complex problems in simple and consequential information; therefore, must be able to effectively communicate knowledge, problems and solutions, both written and verbal, in a clear, scientifically validly and properly, with both specialists in the relevant working groups to professional context. scientifically validly and properly, with both specialists in the working groups relevant to the professional context.They must also be able to provide information and advice to patients in a dialogue using understandable language. Such skills include the ability to relate within the Community and third countries making use of the knowledge of written and spoken English.The methods and teaching tools for achieving and monitoring the achievement of this objective consist of seminars related topics of research in the fields of science and characteristic in qualifying activities such as training, under the guidance of a teacher and / or external parties qualified, and request the student to report on these activities, making use of multimedia tools.

Learning skills. Graduates of the Master Degree in Pharmaceutical Chemistry and Technology must be developed through the acquisition of an appropriate method of study, skills and learning logic necessary for the continuous updating of their knowledge in the pharmaceutical field and to undertake, with high degree of autonomy, higher-level studies in the EU or outside, in the latter case, using knowledge of written and oral English. Therefore, the training activities that characterize the participation in seminars on the scientific frontier topics, the professional internship training, the execution of final written a paper on a topic of original research, are the methods and instruments suitable for pursuing teaching the expected results, the achievement of which appears monitored through the assessment of the degree of autonomy achieved by carrying out these activities.

Clause 3

Admission requirements and provisions concerning the performance of educational debt

To be admitted to the Master Degree Course in one cycle in Pharmaceutical Chemistry and Technology need to be in possession of a diploma five-year upper of secondary school or other educational qualifications obtained abroad and recognized equivalent.

To ensure the quality requirements laid down by the laws in force, taking into account the need to take advantage of highly specialized laboratories single seat, since Directive 85/432/EEC provides for a period of professional internship at a pharmacy open to the public or in a hospital under the supervision of pharmaceutical services, the Council of Master Degree Course, according to Article 2, paragraph 1 (letters a-b) of the Law of 2 August 1999 n. 264, there is a need to plan on. The number of admitted students and the modalities of the selection process will be published annually in the Announcement of a competitive exam for the Admission to the Master Degrees of the class LM-13 - Pharmacy and Industrial Pharmacy, issued by the University of Messina .

The requirements for students who intend to enroll in the Master Degree Course in one cycle in Pharmaceutical Chemistry and Technology are the possession of the ability to analyze written texts of various kinds and the attitude to the logical-mathematical reasoning. Moreover, the knowledge and the skills required are the scientific disciplines of Biology, Chemistry, Physics and Mathematics.

The knowledge and skills required for access are positively verified with the achievement, in the test for admission to the course of study, the minimum grade specified in the Announcement of a competitive exam for the Admission. If verification is not successful, are assigned additional learning requirements (OFA), which will be acquitted by passing a test (this test will take place on the days indicated in the Announcement of a competitive exam for the Admission), or by passing the General inorganic chemistry and

Elements of physical chemistry exam. This obligation must be fulfilled by the date approved by the Academic Bodies and published on the University website. The failure to perform the obligation additional learning involves the repetition of enrollment in the first year of the course.

Clause 4

University educational credit (CFU)

The University educational credit (CFU), hereinafter referred to as credit, corresponds to 25 hours of work per student that is so divided according to type of training:

a) Lectures, seminar lessons for further study, theoretic-practical lessons, exercises in class (L) = 8 hours of frontal teaching and 17 hours of individual study
b) Individual exercises in the laboratory (E) = 12 hours of frontal teaching and 13 hours of individual study
c) 25 hours of project or study to prepare graduation thesis
d) 25 hours of internship
e) 30 hours of pratical pre-degree professional activity

Is there a periodic review by the Council of Master Degree Course in Pharmaceutical Chemistry and Technology of the credits earned in order to assess the non-obsolescence of content knowledge. This verification, however, can not determine a period of validity of the credits earned less than the duration of the Master Degree Course in Pharmaceutical Chemistry and Technology itself.

Matters not covered in this clause shall be governed by c.10 of the RDA.

Clause 5

Acquisition of credits (CFU) and procedures for verifying the profit

The credits corresponding to each training activity are acquired by the student with the passing of disciplines, or through other forms for verifying the profit established by this clause, subject to quantification in thirtieths vote for the examinations and centodecimi for the graduation thesis defence, with possible praise.

The recognition of credits earned by students are stated in Clauses 21 and 22 of the RDA.

Students to sit for an exam must have fulfilled compulsory attendance obligation as laid down in article 6 of this Regulations.

The tests and verifications of profit must respect the successions reported in Manifesto of the Course of Study.

Depending on the type and duration of the teaching have provided the following rules that determine successful completion of the course and the acquisition of credits allocated:

a) examinations (practical and / or written and / or oral), whose vote is expressed in thirtieths;
b) testings (practical and / or written and / or oral) to be resolved in the case of a positive outcome in a recognition of "fit" listed on the university student's personal record book.

Although not mentioned in this article apply the provisions of clause 22 of the RDA.

Clause 6

Attendance to course

The frequency of courses of the disciplines reported in plan of teaching activities of the Master Degree Courese in Pharmaceutical Chemistry and Technology is required under Directive 85/432/EEC and, therefore, there are no forms of exemption from participation in learning activities. Students who fall in the cases provided for by clause 27 of the RDA is only allowed to meet the same obligations owed by students full-time for the attainment of the qualification over a period of double academic years as required by provisions in force without pay in terms out of the course and could benefit from a reduction in the amount of annual contributions due.

Absences are permitted for no more than 30% of the hours of Individual exercises in the laboratory and not more than 50% of hours of lectures , except in cases of proven need for a greater number of absences that will be assessed by the Council of the Master Degree Course in Pharmaceutical Chemistry and Technology.

The determination of the frequency will be made using the means provided under the laws in force. At the end of each course of instruction the professor must take care to send a list of names of students who have fulfilled their obligations under this article to the Secretariat students, where such documentation is kept and used for the certification of attendance of the student in that discipline.

If the student has not satisfied the obligation under this article may not enroll the following year until you have satisfied this obligation.

Clause 7

Enrolment to years of course beyond the first - Final examination

The minimum number of credits to be acquired or the minimum number of examinations to be completed by the student for entry to years of course beyond the first is set by the Council of Master Degree Course in Pharmaceutical Chemistry and Technology and reported in the Manifesto of the Course of Study. This number may be changed by the course Council of Master Degree Course in Pharmaceutical Chemistry and Technology every year based on statistics on the various aspects of teaching.

To achieve the Master Degree in Pharmaceutical Chemistry and Technology, the student must have acquired 300 credits including those related to professional internship (30CFU) and the preparation of the graduation thesis (20CFU) and having taken the exam for degree

To be admitted to the final examination of Master Degree in Pharmaceutical Chemistry and Technology, the student must:

a) having followed all the courses provided by Learning and have acquired a total of 300 CFU articulated in the course of 5 years including those related to professional internship (30CFU) and preparation for the graduation thesis (20CFU)

b) have made application to the Rector 10 days before the date fixed for master degree examination and be lodged at the Student Secretariat of the Department of Pharmaceutical Sciences and Health Products one paper copy of the graduation thesis signed by the supervisor, the member of the graduation examining board who challenges the graduate's dissertation and endorsed by the Coordinator of the Master Degree in Pharmaceutical Chemistry and Technology and one CD/DVD containing a copy in electronic format (.pdf) of the graduation thesis signed by the supervisor, the member of the graduation examining board who challenges the graduate's dissertation and endorsed by the Coordinator of the Master Degree in Pharmaceutical Chemistry and Technology at the Teaching Office of the Department of Pharmaceutical Sciences and Health Products

The of Master Degree examination consists in the discussion of a paper written in Italian, accompanied by an abstract in English, on a original topic of research mono-or multi-disciplinary, carried out under the guidance of a professor acting as supervisor , supported in the case of interdisciplinary research by a faculty co-supervisor, at research laboratories of the Department of Pharmaceutical Sciences and Health Products or other public or private laboratories, with which have been drown up special conventions with the University of Messina. This master degree thesis will have developed all aspects of design and realization of the research carried out and any of the links with the current state of knowledge in one of the scientific disciplines of biological, chemical or medical fileds. The Council of Master Degree Course, based on criteria established at the beginning of the academic year, will assign the supervisor, taking into account the preferences expressed by the student in the application form of the graduation thesis; the Council also will assign the member of the graduation examining board who challenges the graduate's dissertation, who, representing the Council's role will be to monitor the planning and execution phases of research.

To determine the master degree grade, expressed as centodecimi contribute the following parameters:

a) the average grade in examinations [1] expressed in centodecimi. In order to properly assess the weight that individual educational activities have in the formation of the Student, the average will be calculated after conversion into credit-points (P_{CFU}) grades achieved in each examination [2]; *([1] The vote 30/30 and praise for the purposes of calculating the average equals 33; [2] The conversion in* $\boldsymbol{P_{CFU}}$ *of a vote in thirtieths will be conducted with the following calculation:* $\boldsymbol{P_{CFU} = \{[(V \times CFU) / T_{CFU}] / 3\} \times 11}$*, dove* ***CFU*** *= number of credits allocated to the discipline;* ***V*** *= vote in thirtieths attained in the examination;* $\boldsymbol{T_{CFU}}$ *= total number of credits earned by examination. The sum of* P_{CFU} *achieved by the individual student throughout the training process will be the voting base, expressed in centodecimi, with which the student is to take the Master Degree examination.)*

b) the score awarded by the Board of Master Degree for the discussion of the graduation thesis and for his efforts in producing the final paper on the advice of the supervisor (0 to 8.4 points, equivalent to 76% of points available to the board);

c) the attribute points for the duration of the study (from 0 to 2.6 points, equivalent to 24% of points available to the board);

The master degree grade (a+b+c) is rounded up or down to the nearest whole number. Praise can be given with the unanimous opinion of the Board to applicants who have an average grade in exams curricular> 102/110 and achieve a final score> 110/110.

At the beginning of each academic year, the professors of the biological, chemical and medical areas of the Master Degree Course in Pharmaceutical Chemistry and Technology of the Department of Pharmaceutical Sciences and Health Products will inform the Course Coordinator of research topics which may be subject to assignment to experimental graduation thesis and the number of students who are able to accommodate in the research laboratories in which they operate. This number is determined annually by the Council of Master Degree Course in Pharmaceutical Chemistry and Technology on the basis of statistics data provided by the Student secretariat.

The written request by the student for the award of the supervisor to prepare for the graduate thesis must be submitted to the Secretariat and students in a copy to the Coordinator of the Master Degree in

Pharmaceutical Chemistry and Technology during the fourth year after passing at least eighteen exams, stating in order of preference ten professors of the biological, chemical or medical areas care and for each of them the scientific-disciplinary field. The Council of Master Degree Course in Pharmaceutical Chemistry and Technology will assign the supervisor, taking into account the preferences expressed by the student. If requests for a particular supervisor exceed the number of places available communicated by that teacher will take into account: 1) number of exams passed, 2) number of exams passed relating to subjects related to the scientific field of the supervisor required; 3) the arithmetic average of the votes of exams passed 4) arithmetic average of the exams related to the disciplines related to the scientific -disciplinary supervisor required.

The Council of Master Degree Course in Pharmaceutical Chemistry and Technology on the procedures provided for in this article also will assign the member of the graduation examining board who challenges the graduate's dissertation, who, representing the Council's role will be to monitor the planning and execution phases of research.

Clause 8

Plan of teaching activities

The Council of Master Degree Course in Pharmaceutical Chemistry and Technology provides every academic year the (annual or half-year or four-month) plan of teaching activities on the basis of the instructions of the Academic Senate and Department Council.

The teaching activities schedule sets the dates of start and end of training, periods of the examinations and periods of suspension of the teaching activities. The schedule of teaching activities is advertised as provided in the RDA.

With a reasonable time before the beginning of lessons, the Council of Master Degree Course in Pharmaceutical Chemistry and Technology establish and make public the times and lecture halls/laboratories where the teaching activities will be conducted and notify this decision to the Dean. To ensure the conduct of the training activities the Course Coordinator may, for reasons of force majeure, change times and lecture halls/laboratories, inviting the professors to notify the measureto students attending the courses in question.

For matters not covered in this article applies to clause 20 of the RDA.

Clause 9

Articulation of teaching activities and plan of study

The articulation of the Master Degree Course in Pharmaceutical Chemistry and Technology chronology, the organization of educational-training, and teaching-learning objectives to be achieved are set by the RDA.

Work-learning training is organized on the basis of mono-or integrated courses that can be divided into modules, set annually by the Council of Master Degree Course in Pharmaceutical Chemistry and Technology according to the nature and type of each discipline and by checks and surveys on various aspects of teaching. Each discipline or integrated course may be taught by one or more professors, the only remaining program of the course and only the verify of the profit and the acquisition of credits by one of the conditions specified under clause 5 of this Regulation.

The official plan of study, propaedeutic disciplines, and the minimum number of credits to be acquired or pass exams for entry to years of course beyond the first are given for each academic year of in the Manifesto of Study.

The individual plans of study provided by c.21 and c.23 of the RDA should be submitted to the Student Secretariat and a copy to the Coordinator of the Master Degree in Pharmaceutical Chemistry and Technology. These plans of study should be detailed and shall indicate the use of the 8 credits to be chosen by the student in compliance with the Manifesto of the Studies. The individual plans of study provided by c.21 and c.23 of the RDA, will be screened out by the Commission established by the Council of Master Degree in Pharmaceutical Chemistry and Technology, and approved by the Council of Master Degree in Pharmaceutical Chemistry and Technology itself, and must abide by the guidelines set annually in the Manifesto of the Studies.

Art. 10

List teaching activities and educational goals of the disciplines

The list of teaching activities with their specific name and other activities covered in DD.MM, with the identification of credits are shown in the table below which is an integral part of this Regulation

ANNUAL PLAN OF TEACHING ACTIVITIES

Y	D.P.	C.A.T.	I.A.	SDF	DENOMINAZIONE DISCIPLINE	CFU	L	E	S-P-T
I	I	E			Physics and Elements of mathematic and statistic calculus	12	96		204
			B	FIS/03	Physics	6	48		102
			B	MAT/03	Elements of mathematic and statistic calculus	6	48		102
I	I	E			General inorganic chemistry and Elements of physical chemistry	14	112		238
			B	CHIM/03	General inorganic chemistry	10	80		170
			A	CHIM/02	Elements of physical chemistry	4	32		68
I	I	E	B	BIO/16	Animal biology and Human anatomy	10	80		170
I	II	E	B	MED/07	Microbiology	8	64		136
I	II	E	C	BIO/15	Pharmaceutical Plant Biology	8	56	12	132
I	II	E	B	CHIM/01	Analytical chemistry	8	64		136
II	I	E	B	CHIM/06	Organic chemistry	10	80		170
II	I	E	C	CHIM/08	Drug analysis I	8	32	48	120
II	I	V			Language skills: English	5	40		85
II	I	V			Computer skills	3	24		51
II	II	E	C	BIO/10	Biochemistry and Applied biochemistry	12	96		204
II	II	E	B	CHIM/06	Advanced organic chemistry	6	48		102
II	II	E	C	BIO/15	Pharmacogosy	8	48	24	128
II	II	E	C	CHIM/08	Drug analysis II	8	32	48	120
III	I	E	B	BIO/09	Human physiology	6	48		102
III	I	E	B	MED/04	General patology	6	48		102
III	I	E	A	CHIM/06	Structural characterization of organic compounds	8	64		136
III	I	E	C	CHIM/08	Medicinal chemistrry I	10	80		170
III	II	E	C	CHIM/09	Pharmaceutical technology	10	48	48	154
III	II	E	C	CHIM/10	Food chemistry	6	48		102
III	II	E	C	BIO/14	General pharmacology	6	48		102
III	II	E			Free credits	8	64		136
IV	I	E	C	CHIM/08	Medicinal chemistry II	10	80		170
IV	I	E	C	CHIM/09	Applied pharmaceutical chemistry and Industrial formulation of medicines	10	80		170
IV	II	E	C	CHIM/08	Drug analysis III	8	32	48	120
IV	II	E	C	BIO/14	Pharmacology and pharmacotherapy	10	80		170
IV	II				Practical pre-degree professional internship	22			660*
V	I	E	C	BIO/14	Toxicology	8	64		136
V	I	E	C	CHIM/08	Lab-based course on synthetic and semisyntetic preparation of drugs	8	32	48	120
V	I	E	C	CHIM/08	Advanced medicinal chemistry and Pharmaceutical biotechnologies	10	80		170
V	II	E	C	CHIM/09	Italian and European pharmaceutical legislation	6	48		102
V	II				Practical pre-degree professional internship	8			240*
V					Experimental thesis	20			500

Legend: Y= Years. **D-P.**=Didactic Period. **C.A.T.** = Credits acquisition typology: E= Examination; V=Verify. **I.A.**= Instructive activities: B= basics; C= distinctive; A= additional; AL=others instructive activities. **SDF**=Scientific-disciplinary field. **CFU** = Credits **L**= Lesson hours; **E**= Exercises in laboratory hours; **S**= Study hours; **P**= Study hours for experimental thesis; **T**= pratical pre-degree professional acrivity ***1CFU=30 hours Note Direzione Generale of MIUR prot. n.570 dell'11-03-11.

The description of the objectives to be achieved in relation to knowledge and skills that must be acquired by the students, with regard to individual teaching, as clause. 15, c.3 of the RDA, are shown in the table below which is an integral part of this Regulations.

A.F. I.A.	SSD SDF	TEACHING ACTIVITIES EDUCATIONAL GOALS
B	MAT/03	**Elements of mathematical and statistical calculus** Knowledge of mathematical and statistical calculus applied to the subjects studied in the degree course.
B	FIS/03	**Physics** Knowledge of the general principles of physics connected to the subjects studied in the degree course.
B	CHIM/03	**General inorganic chemistry**

		Knowledge of the atomic structure of matter, chemical bonds, reactivity, chemical balance and properties of the main elements.
B	CHIM/01	**Analytical chemistry** Knowledge of fundamental concepts to define qualitative and quantitative composition both of natural and artificial chemical systems.
B	CHIM/06	**Organic chemistry** Knowledge of fundamental organic chemistry, of the chemism of functional groups, of stereochemistry and of the main carbocyclic and heterocyclic systems.
B	CHIM/06	**Advanced organic chemistry** Insight into the chemism of functional groups, stereochemistry and the main carbocyclic and heterocyclic systems.
B	BIO/16	**Animal biology and Human anatomy** Knowledge of the animal cell structure and function and of reproductive mechanisms. Knowledge both of macro and micromorphology of the human body.
B	MED/07	**Microbiology** Knowledge of prokaryotes for applied, pharmaceutical and industrial microbiology and chemotherapy. Knowledge of pathogenicity of bacteria, mycetes and viruses.
B	BIO/09	**Human physiology** Knowledge of the physiology of both relational and vegetative human life.
B	MED/04	**General patology** Knowledge of useful notions of etiopathogenesis, names of human conditions and medical terminology.
C	BIO/10	**Biochemistry and applied biochemistry** Knowledge of metabolic processes and metabolic control to conveniently face subsequent studies on effects, actions and design of drugs. Knowledge of both methodologies and methodological schemes as a basis for the study of biomolecules
C	BIO/15	**Pharmaceutical Plant Biology** Knowledge of plants as renewable sources of natural drugs and pharmaceutical excipients. Acquisition of the analytic methods for medicinal plants identification.
C	BIO/15	**Pharmacognosy** Knowledge of natural drugs and related therapeutic use, extraction and identification methods.
C	CHIM/08	**Drug analysis I** Knowledge and application of methods for the qualitative analysis of inorganic/organic drugs included in the European Pharmacopoeia.
C	CHIM/08	**Drug analysis II** Knowledge and application of the methods for the quantitative determination of drugs included in the European Pharmacopoeia.
C	CHIM/08	**Drug analysis III** Knowledge and application of the methods for the identification of drugs included in the European Pharmacopoeia and related purity assays
C	CHIM/08	**Medicinal chemistrry I** Knowledge of medicinal chemistry with specific regard to the drug-target interaction and to the main approaches and strategies of drug design. Knowledge of design, synthesis, structure-activity relationships, mechanisms of action at a molecular level, and therapeutic use of several drug classes.
C	CHIM/08	**Medicinal chemistry II** Knowledge of design, synthesis, structure-activity relationships, mechanisms of action at a molecular level and therapeutic use of several drug classes.
C	CHIM/08	**Advanced medicinal chemistry and Pharmaceutical biotechnologies** Insight into pharmaceutical chemistry, study and application of innovative methods for drugs design and discovery. Basic knowledge of innovative biotechnology applied to the development of new drugs on an industrial scale and pharmaceuticals produced using biotechnology.
C	CHIM/08	**Lab-based course on synthetic and semisynthetic preparation of drugs** Theoretical and practical knowledge of synthetic and semisynthetic methodologies of compounds of pharmaceutical interest.
C	CHIM/09	**Pharmaceutical technology** Basic knowledge of preparation and control of conventional and innovative pharmaceuticals.
C	CHIM/09	**Applied pharmaceutical chemistry and Industrial formulation of medicines** Study of chemical-physical properties of active substances to increase their absorption and bioavailability and technological strategies for the formulation and vehicolation of drugs. Knowledge of technological features related to the pharmaceutical industry.
C	CHIM/09	**Italian and European pharmaceutical legislation** Knowledge of laws and ethics for professional practice both at a national and at European Community level.
C	CHIM/10	**Food chemistry** Knowledge of the chemical and nutritional properties of foods; analytical methods for the quality and genuineness assessment and food processing technologies.
C	BIO/14	**General pharmacology** Fundaments of cellular and molecular action mechanisms of drugs and their pharmacokinetic characteristics.
C	BIO/14	**Pharmacology and pharmacotherapy** Knowledge of molecular action mechanisms, pharmacokinetic characteristics, therapeutic drug use and contraindications of the main drugs.
C	BIO/14	**Toxicology** Knowledge of the main processes contributing to the toxicity of chemical or physical agents on an animal organism and of the possible protective/preventive measures.
A	CHIM/02	**Elements of physical chemistry** Knowledge of both kinetic and thermodynamic aspects of chemical reactivity.
A	CHIM/06	**Structural characterization of organic compounds**

		Knowledge of spectroscopy and its various applications.
AL		**Language skills: English** Acquisition of language skills with reference to the scientific language of the pharmaceutical field.
AL		**Computer skills** Acquisition of computer skills applied to the pharmaceutical field

Legend: I.A.= Instructive activities: B= basics; C= distinctive; A= additional; AL=other instructive activities. **SDF**=Scientific-disciplinary field

Clause 11

Student mobility and study abroad

Apply the provision of clause 25 of the RDA.

Clause 12

Transfer and admission to individual course

In cases of transfer from other universities, from other courses or degree course, the Council of Master Degree in Pharmaceutical Chemistry and Technology, deliver its opinion to the Faculty Council, on acceptance of applications indicating the year of progress at which the student must entry and, on a case by case basis, the possibility of validation of credits already earned by the student in the previous course based on the laws in force.

According to clause 3 of D.M. 16/03/07, in the case of transfer of students from a degree course in one cycle of the Class LM-13 of the same or another university, will receive the largest possible number of credits already earned by the student, also possibly talks for the verification of the knowledge actually possessed and motivating the possible denial of credit. In each case the proportion of credits relating to the same disciplinary field directly recognized the student can not be less than 50% of those already accrued.

Although not mentioned in this article apply the provisions of clause 23 of the RDA.

Clause 13

Special educational activities, guidance and mentoring

In order to make mature and conscious choice of university studies and to provide a mentoring service and support for the welcome and the support of students, to prevent the dispersion and the delay in the study and promote effective active participation in university life in all its forms, the Master Degree Course in Pharmaceutical Chemistry and Technology will organize the activities of guidance and mentoring provided by law, articulated in particular in the three basic stages of their university life: choice of the faculty and Course of study, training from registration to graduation, access to employment in accordance with the provisions of the RDA and the Regulations for the Guidance and Mentoring issued by the Academic Senate.