COMPARATIVE ANALYSIS OF EDUCATIONAL REGULATIONS OF THE BACHELOR'S DEGREE COURSE IN "BIOMEDICAL LABORATORY TECHNIQUES" IN THE LOMBARD UNIVERSITIES

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ABSTRACT

With the institution of university courses, the course of study of the biomedical laboratory technician has experienced a real revolution. At the basis of the training of university courses there are decrees and laws that aim to standardize, while maintaining the autonomy of the universities, the educational offer that is provided to the undergraduate nationally. The purpose of this document is to understand the basics of structuring a degree course and to compare the educational offer that the Lombard university system makes available to future biomedical laboratory technicians. Starting from the analysis of the study plans of the degree courses, obtained from the institutional sites of the five Lombard universities that offer this path, a comparison was made between the standard in force on the construction of the degree course in biomedical laboratory techniques and the distribution of ECTS operated by each university in its teaching plan. The analysis highlighted a substantial similarity between the organizations of the degree course and adherence to regulatory indications. The only exceptions are the presence in some didactic plans of training activities no longer present in the current legislation and a poor valorization in some universities of the MED / 46 (Biotechnology and Methods in Laboratory Medicine), the academic discipline of reference for the professional profile of the biomedical laboratory technician.

INTRODUCTION

The transition from a double training system, the university and the regional one, to a single training course inserted in the university environment was, for the health professions, a gradual transition introduced with the legislative decree 30 December 1992, n.502 (Art. 6) and subsequent amendments. In particular, for the profession of laboratory technician, in addition to regional courses and schools for special purposes, qualifications obtained following some high school training courses also qualified for the profession. The law of November 19, 1990, n.341 provides for the abolition of schools for special purposes and introduces the three-year university diploma course and the Ministerial Decree of July 24, 1996 approves table XVIII-ter containing the university didactic regulations of university diploma courses of the health area in compliance with the above-mentioned law of 1990. The change introduced with the reform of the didactic systems has mainly affected the didactic objectives, the didactic areas, the study plans and the related academic disciplines. The purpose of the Ministerial Decree of 24 July 1996 is to define the national standards for each single type of Diploma Course. University teaching has undergone a profound transformation with the MM.DD. n. 509 of 11/13/1999 and n. 270 of 22/10/2004 dictating general criteria for the organization of university studies. Between the two decrees cited, other ministerial decrees followed which identified the classes of the study courses, the qualifying training objectives and the training activities indispensable to achieve them. In particular, for the health professions, the Ministerial Decree 04/02/2001 "Determination of the classes of the university degrees of the health professions" identifies the classes of the university degrees of the health professions distinguishing four degree classes:

1. Nursing and midwifery sciences (SNT/1);
2. Health professions for rehabilitation (SNT/2);
3. Health professions for technical sciences (SNT/3);
4. Health professions for preventive care (SNT/4).

In this period, we are witnessing a real revolution in the basic training of health professionals who can now count on university-level training in a bachelor's degree. The qualifying educational objectives of the university course of the health professions for technical sciences (class that includes the profession of biomedical laboratory technician) are identified first with the inter-ministerial decree of 2 April 2001 and then updated by the subsequent inter-ministerial decree of 19/02/2009 " Determination of the degrees of the degrees of the health professions" which reshapes the structure having regard to the decree of 22/10/2004, n.270 "Amendments to the regulation containing rules concerning the didactic autonomy of universi-

ties, approved by decree of the Minister of the University and of scientific and technological research 3 November 1999, n. 509 ". In particular, the decree defines the basic criteria that a bachelor's degree of the third class must have and the skills that must provide the biomedical laboratory technician undergraduate.
The structure of a university degree course is based on a unit of measurement of the workload required of the student introduced with the Ministerial Decree 3/11/1999, n.509 "Regulations containing rules concerning the didactic autonomy of universities" where in the Article number five the Formative University Credit (CFU, in the Italian normative) which correspond to an European Credit Transfer System (ECTS) is defined as 25 hours of work per student with a maximum of 60 ECTS / year per course of study. Alongside the workload estimation, another pillar of the organization of a university course are the academic disciplines. The academic disciplines, called in Italy "scientific disciplinary sectors" (SSD), define the teaching subjects and are the pieces that together with the ECTS make up the didactic plan of the degree courses. Identified for the first time with the law of 15/05/1997, n. 127 "Urgent measures for streamlining administrative activities and decision-making and control procedures".
The Ministerial Decree 3/11/1999, n.509 "Regulations containing rules concerning the didactic autonomy of universities" also in describing the formulation of the didactic regulations in article 11 specifies how the credits assigned to each training activity must be referred to one or more specific academic disciplines. The same Decree 509 also describes in article 10 paragraph 1 that:
"The ministerial decrees preliminarily identify, for each class of study courses, the qualifying training objectives and the training activities essential to achieve them, grouping them into six types:
a) training activities in one or more disciplinary areas relating to basic training;
b) training activities in one or more disciplinary areas characterizing the class;
c) training activities in one or more disciplinary fields related to or integrating those characterizing, with particular regard to context cultures and interdisciplinary training;
d) educational activities independently chosen by the student;
e) training activities related to the preparation of the final exam for the attainment of the qualification and, with reference to the degree, to the verification of knowledge of the foreign language [...] " [2]
In the same article in paragraph 2 it adds:
"The ministerial decrees also determine, for each class, the minimum number of credits that the teaching systems reserve for each training activity and for each disciplinary area referred to in paragraph 1 [...]" [2]
For the bachelor's degree in "biomedical laboratory techniques" this definition was implemented with the inter-ministerial decree of 2/04/2001 "Determination of the classes of university degrees in the health professions" and then updated by the subsequent inter-ministerial decree of 19/02/2009 " Determination of the graduation classes of the health professions".
The inter-ministerial decree of the Ministry of Health and the Ministry of University of 19 February 2009 called "Determination of the degrees of the degrees of the health professions" identifies the general objectives and the organization of the courses of three-year degree in health professions for each class. The decree sets out the qualifying training objectives and then deepens the indispensable training activities in detail.

The training activities that are indispensable for a bachelor's degree course in the 3rd class of the health professions are set out in the decree in specific tables that consist of five columns:
1. Training activities;
2. Disciplinary areas;
3. Scientific disciplinary sectors;
4. Minimum ECTS by subject area;
5. Minimum ECTS for training activity.

The training activities divide all the activities into two large macro areas:
- Basic training activities (Table 1);
- Characteristic training activities (Table 2 a / b / c).

In turn, each training activity is divided into several disciplinary areas which are macro containers for specific academic disciplines. The table also specifies for each subject area the minimum credits that must be considered in the formulation of the teaching plan and that make up a minimum of credits for the entire training activity. During the construction of the teaching plan, the university, also due to its autonomy, manages the ECTS of the various teaching modules taking into account the minimum ECTS for each disciplinary area, including in the teaching plan various courses that correspond to specific academic disciplines for that area. Among the disciplinary areas of the characterizing training activities, it is specified that in the organization of the degree course the academic disciplines of reference for each profile (for the biomedical laboratory technician it is the MED / 46 "Biotechnology and Methods in Laboratory Medicine") must

ATTIVITÀ FORMATIVE INDISPENSABILI				
Attività formative:	**Ambiti disciplinari**	**Settori scientifico-disciplinari**	**CFU**	**Tot. CFU**
Di base	**Scienze propedeutiche**	FIS/07 - Fisica applicata (a beni culturali, ambientali, biologia e medicina) INF/01 - Informatica ING-INF/07 - Misure elettriche ed elettroniche M-DEA/01 - Discipline demoetnoantropologiche M-PSI/01 - Psicologia generale MAT/05 - Analisi matematica MED/01 - Statistica medica SPS/07 - Sociologia generale	8	**22**
	Scienze biomediche	BIO/09 - Fisiologia BIO/10 - Biochimica BIO/12 - Biochimica clinica e biologia molecolare clinica BIO/13 - Biologia applicata BIO/16 - Anatomia umana BIO/17 - Istologia MED/03 - Genetica medica MED/04 - Patologia generale MED/05 – Patologia clinica MED/07 - Microbiologia e microbiologia clinica	11	
	Primo soccorso	BIO/14 - Farmacologia MED/09 - Medicina interna MED/18 - Chirurgia generale MED/41 - Anestesiologia MED/45 - Scienze infermieristiche generali, cliniche e pediatriche	3	

Tab. 1 - *Subdivision of the basic training activities*

count at least 15 ECTS on the three-year plan. The indispensable training activities must be included in a minimum of 126 credits out of the 180 credits that make up the three-year degree course. This denotes the wide margin of autonomy left to individual universities in the organization of their three-year degree course. With this work we want to analyze the structure of the degree courses in "biomedical laboratory techniques" active in Lombard region, describing how each course has divided its activities into the Academic Discipline, by type and number of ECTS, in accordance with the interministerial decree of 19 February 2009 and highlighting similarities and differences.

METHODOLOGY AND MATERIALS

The analysis started from the research on the institutional sites of the Lombard universities, and from the reading of the didactic regulations of each university from which the didactic plans divided for the three years of the course were drawn. Using Microsoft Excel, the various didactic plans were structured into tables, highlighting the subdivision that each university made of the various disciplinary areas and academic disciplines in the construction of the didactic plan, in accordance with the tables of the indispensable training activities of the decree of the 19/02/2009, and how the other "ancillary" training activities envisaged by the decree were organized in addition to the indispensable ones:

- Activity chosen by the student;
- Professional laboratories of the specific academic

Caratterizzanti	***Corsi differenziati art. 10, comma 3 del D.M. 270/2004 - Almeno 15 CFU assegnati al SSD di riferimento di ogni specifico profilo**		30	**104**
	*** Scienze e tecniche audiometriche**	M-PSI/08 - Psicologia clinica MED/31 - Otorinolaringoiatria MED/32 - Audiologia MED/38 - Pediatria generale e specialistica MED/39 - Neuropsichiatria infantile MED/43 - Medicina legale MED/44 - Medicina del lavoro MED/48 - Scienze infermieristiche e tecniche neuro-psichiatriche e riabilitative MED/50 - Scienze tecniche mediche applicate		
	*** Scienze e tecniche di laboratorio biomedico**	BIO/12 - Biochimica clinica e biologia molecolare clinica MED/03 - Genetica medica MED/04 - Patologia generale MED/05 - Patologia clinica MED/07 - Microbiologia e microbiologia clinica MED/08 - Anatomia patologica MED/09 - Medicina interna MED/15 - Malattie del sangue MED/46 - Scienze tecniche di medicina e di laboratorio VET/06 – Parassitologia e malattie parassitarie degli animali		
	*** Scienze e tecniche di radiologia medica per immagini e radioterapia**	FIS/07 – Fisica applicata (a beni culturali, ambientali, biologia e medicina) MED/36 – Diagnostica per immagini e radioterapia MED/37 – Neuroradiologia MED/50 – Scienze tecniche mediche applicate		
	*** Scienze e tecniche di neurofisiopatologia**	MED/10 – Malattie dell'apparato respiratorio MED/11 – Malattie dell'apparato cardiovascolare MED/26 – Neurologia MED/33 – Malattie apparato locomotore MED/39 – Neuropsichiatria infantile MED/48 – Scienze infermieristiche e tecniche neuro-psichiatriche e riabilitative MED/50 – Scienze tecniche mediche applicate		

Tab. 2 / a - *Subdivision of the characterizing training activities*

	*** Scienze e tecniche ortopediche**	MED/33 – Malattie apparato locomotore MED/34 – Medicina fisica e riabilitativa MED/36 – Diagnostica per immagini e radioterapia MED/50 – Scienze tecniche mediche applicate		
	*** Scienze e tecniche della fisiopatologia cardiocircolatoria e perfusione cardiovascolare**	ING-IND/22 - Scienza e tecnologia dei materiali MED/11 – Malattie dell'apparato cardiovascolare MED/15 – Malattie del sangue MED/21 – Chirurgia toracica MED/22 – Chirurgia vascolare MED/23 – Chirurgia cardiaca MED/50 – Scienze tecniche mediche applicate		
	*** Scienze dell'igiene dentale**	MED/07 – Microbiologia e microbiologia clinica MED/28 – Malattie odontostomatologiche MED/42 – Igiene generale e applicata MED/50 – Scienze tecniche mediche applicate		
	*** Scienze della dietistica**	AGR/15 – Scienze e tecnologie alimentari CHIM/10 – Chimica degli alimenti M-PSI/08 – Psicologia clinica MED/09 – Medicina interna MED/11 – Malattie dell'apparato cardiovascolare MED/12 – Gastroenterologia MED/13 – Endocrinologia MED/14 – Nefrologia MED/38 – Pediatria generale e specialistica MED/42 – Igiene generale e applicata MED/49 – Scienze tecniche dietetiche applicate SECS-P/13 - Scienze merceologiche		
	*** Scienze e tecniche audioprotesiche**	ING-IND/22 - Scienza e tecnologia dei materiali ING-INF/07 - Misure elettriche ed elettroniche MED/31 – Otorinolaringoiatria MED/32 – Audiologia MED/50 – Scienze tecniche mediche applicate		
	Scienze medico-chirurgiche	BIO/14 – Farmacologia MED/05 – Patologia clinica MED/08 – Anatomia patologica MED/17 – Malattie infettive MED/18 – Chirurgia generale MED/33 – Malattie apparato locomotore MED/40 – Ginecologia e ostetricia	2	

Tab. 2 / b - *Subdivision of the characterizing training activities*

	Scienze della prevenzione e dei servizi sanitari	BIO/12 – Biochimica clinica e biologia molecolare clinica M-EDF/01 - Metodi e didattiche delle attività motorie MED/36 – Diagnostica per immagini e radioterapia MED/37 – Neuroradiologia MED/42 – Igiene generale e applicata MED/43 – Medicina legale MED/44 – Medicina del lavoro MED/45 – Scienze infermieristiche generali, cliniche e pediatriche MED/48 – Scienze infermieristiche e tecniche neuro-psichiatriche e riabilitative MED/50 – Scienze tecniche mediche applicate	2	
	Scienze interdisciplinari cliniche	MED/06 – Oncologia medica MED/10 – Malattie dell'apparato respiratorio MED/11 – Malattie dell'apparato cardiovascolare MED/12 – Gastroenterologia MED/13 – Endocrinologia MED/14 – Nefrologia MED/15 – Malattie del sangue MED/16 – Reumatologia MED/19 – Chirurgia plastica MED/20 – Chirurgia pediatrica e infantile MED/21 – Chirurgia toracica MED/22 – Chirurgia vascolare MED/23 – Chirurgia cardiaca MED/24 – Urologia MED/25 – Psichiatria MED/26 – Neurologia MED/27 – Neurochirurgia MED/28 – Malattie odontostomatologiche MED/30 – Malattie apparato visivo MED/31 – Otorinolaringoiatria MED/32 – Audiologia MED/34 – Medicina fisica e riabilitativa MED/35 – Malattie cutanee e veneree MED/36 – Diagnostica per immagini e radioterapia MED/39 – Neuropsichiatria infantile MED/41 – Anestesiologia	4	

Tab. 2 / c - *Subdivision of the characterizing training activities*

	Scienze umane e psicopedagogiche	M-FIL/02 – Logica e filosofia della scienza M-FIL/03 – Filosofia morale M-PED/01 - Pedagogia generale e sociale M-PSI/01 – Psicologia generale M-PSI/03 – Psicometria M-PSI/04 – Psicologia dello sviluppo e psicologia dell'educazione MED/02 – Storia della medicina SPS/07 – Sociologia generale	2	
	Scienze interdisciplinari	ING-INF/05 - Sistemi di elaborazione delle informazioni ING-INF/06 - Bioingegneria elettronica e informatica L-LIN/01 – Glottologia e linguistica SECS-S/02 - Statistica per la ricerca sperimentale e tecnologica	2	
	Scienze del management sanitario	IUS/07 – Diritto del lavoro IUS/09 – Istituzioni di diritto pubblico M-PSI/05 – Psicologia sociale M-PSI/06 – Psicologia del lavoro e delle organizzazioni SECS-P/06 - Economia applicata SECS-P/07 - Economia aziendale SECS-P/10 - Organizzazione aziendale SPS/09 – Sociologia dei processi economici e del lavoro	2	
	Tirocinio differenziato per specifico profilo	MED/46 - Scienze tecniche di medicina e di laboratorio MED/48 – Scienze infermieristiche e tecniche neuro-psichiatriche e riabilitative MED/49 – Scienze tecniche dietetiche applicate MED/50 – Scienze tecniche mediche applicate	60	
TOTALE				**126**

Tab. 2 / d - *Subdivision of the characterizing training activities*

discipline of the profession;
- Other activities such as computer science and seminars;
- Final exam and English language course.

Once the information was collected from the various universities, a comparative analysis was carried out on a single table between the various universities, from which graphics and considerations on similarities and differences in the teaching plans were drawn.

RESULTS AND DISCUSSION

The bachelor's degree course in "Biomedical laboratory techniques" is currently present in Lombardy region in five universities and for the academic year 2020/2021 with decree no. 241 of 26 June 2020 of the Ministry of University, 136 places were assigned to Lombardy region for the admission test to the bachelor's degree course in "biomedical laboratory techniques" divided as in Table 3.

University Of Milan

The educational offer of the University of Milan (UniMi) is divided into three years of courses for a total of 180 ECTS acquired by students at the end of their studies. In particular:

1. The first year provides for the acquisition of 60 ECTS divided into:
- 43 ECTS dedicated to the lessons divided into 8 training activities;
- 8 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 2 ECTS dedicated to two specific courses: Basic chemical analysis course and Workplace safety course;
- 3 ECTS for the assessment of IT skills;
- 2 ECTS for the assessment of the English language.

2. The second year provides for the acquisition of 58 ECTS divided into:
- 33 ECTS dedicated to the lessons divided into 5 training activities;
- 23 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student.

3. The third year provides for the acquisition of 62 ECTS divided into:
- 20 ECTS dedicated to the lessons divided into 4 training activities;
- 28 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated course on "genetic pathologies";
- 3 ECTS dedicated to the professionalizing laboratory in advanced laboratory medicine techniques;
- 7 ECTS for the final exam.

University Of "Milano-Bicocca"

The educational offer of the University of Milan-Bicocca (UniMiB) is divided into three years of courses for a total of 180 ECTS acquired by students at the end of their studies. In particular:

1. The first year provides for the acquisition of 59 ECTS divided into:
- 39 ECTS dedicated to the lessons divided into 5 training activities;
- 14 ECTS dedicated to the Internship;
- 3 ECTS for the assessment of IT skills;
- 3 ECTS for the assessment of the English language.

2. The second year provides for the acquisition of 60

UNIVERSITY	PLACES AVAILABLE
University of Milan	40
University of Milan-Bicocca	28
University of Brescia	28
University of Pavia	25
University of Insubria (Varese)	15
TOTAL	**136**

Tab. 3 - *Subdivision of places available for the 2020/2021 academic year*

ECTS divided into:
- 37 ECTS dedicated to the lessons divided into 6 training activities;
- 20 ECTS dedicated to the Internship;
- 3 ECTS dedicated to activities chosen by the student which can be chosen from a list already present in the didactic regulations of the course.

3. The third year provides for the acquisition of 61 ECTS divided into:
- 20 ECTS dedicated to the lessons divided into 2 training activities;
- 26 ECTS dedicated to the Internship;
- 3 ECTS dedicated to activities chosen by the student that can be chosen from a list already present in the didactic regulations of the course;
- 3 ECTS dedicated to laboratory medicine seminars;
- 3 ECTS dedicated to professionalizing laboratories;
- 6 ECTS for the final exam.

University Of Brescia

The educational offer of the University of Brescia (UniBs) is divided into three years of courses for a total of 184 ECTS acquired by students at the end of their studies. In particular:

1. The first year provides for the acquisition of 62 ECTS divided into:
- 38 ECTS dedicated to the lessons divided into 6 training activities;
- 18 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the "Metabolic Biochemistry" course;
- 1 ECTS dedicated to the safety training course;
- 1 ECTS dedicated to the professionalizing laboratory of the first year;
- 1 ECTS for the assessment of the English language.

2. The second year provides for the acquisition of 60 ECTS divided into:
- 33 ECTS dedicated to the lessons divided into 5 training activities;
- 21 ECTS dedicated to the Internship;
- 3 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the "Mycological Diagnostics" course;
- 1 ECTS dedicated to the professionalizing laboratory of the second year;
- 2 ECTS for the assessment of the English language.

3. The third year provides for the acquisition of 61 ECTS divided into:
- 31 ECTS dedicated to the lessons divided into 5 training activities;
- 21 ECTS dedicated to the Internship;
- 1 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the course "The TLB and the production of scientific data in the research laboratory";
- 1 ECTS dedicated to the professionalizing laboratory of the third year;
- 6 ECTS for the final exam.

Seminar activities have been included in the teaching plan of the University of Brescia as an integral part of the modules of the training activities in particular:
- "Analytical instrumentation" module of the training activity "Institutions of biochemistry and clinical biochemistry" of the first year of the course;
- "General chemistry and biochemical preparatory" module of the training activity "Functional and structural sciences of biomolecules" of the first year of the course;
- "Food analysis" module of the training activity "Clinical microbiology and hygiene" of the second year of the course;
- "Applied computer science" module of the training activity "Interdisciplinary and integrative sciences" of the third year of the course;
- "Radiobiology and radiation protection" module of the training activity "Sciences of prevention and health services, health promotion and ethics" of the third year of the course.

These activities in the analysis were considered part of the ancillary training activity "other activities such as information technology and seminars"

University Of Pavia

The educational offer of the University of Pavia (UniPv) is divided into three years of courses for a total of 180 ECTS acquired by students at the end of their studies. In particular:

1. The first year provides for the acquisition of 62 ECTS divided into:
- 38 ECTS dedicated to the lessons divided into 6 training activities;
- 18 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the "Metabolic Biochemistry" course;
- 1 ECTS dedicated to the safety training course;
- 1 ECTS dedicated to the professionalizing laboratory of the first year;
- 1 ECTS for the assessment of the English language.

2. The second year provides for the acquisition of 60 ECTS divided into:
- 33 ECTS dedicated to the lessons divided into 5 training activities;
- 21 ECTS dedicated to the Internship;
- 3 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the "Mycological Diagnostics" course;
- 1 ECTS dedicated to the professionalizing laboratory of the second year;
- 2 ECTS for the assessment of the English language.

3. The third year provides for the acquisition of 61 ECTS divided into:
- 31 ECTS dedicated to the lessons divided into 5 training activities;
- 21 ECTS dedicated to the Internship;
- 1 ECTS dedicated to activities chosen by the student;

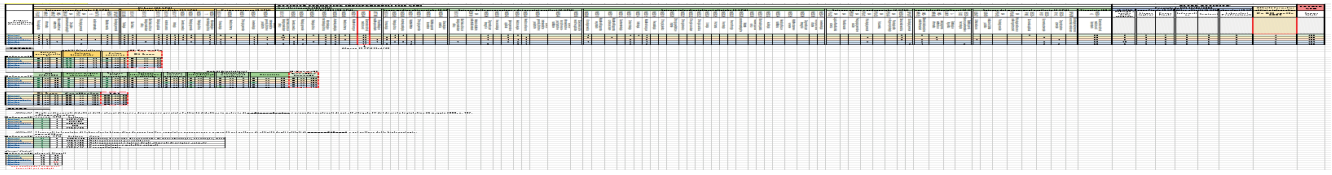

Fig. 1 - *Comprehensive ECTS comparison table*

- 1 ECTS dedicated to the course " The TLB and the production of scientific data in the research laboratory";
- 1 ECTS dedicated to the professionalizing laboratory of the third year;
- 6 ECTS for the final exam.

University Of Insubria -Varese

The educational offer of the University of Insubria (UniInsubria) is divided into three years of courses for a total of 180 credits acquired by students at the end of their studies. In particular:

1. The first year provides for the acquisition of 62 ECTS divided into:
- 38 ECTS dedicated to the lessons divided into 7 training activities;
- 18 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the professionalizing laboratory;
- 3 ECTS for the assessment of the English language.
2. The second year provides for the acquisition of 63 ECTS divided into:
- 34 ECTS dedicated to the lessons divided into 5 training activities;
- 22 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the professionalizing laboratory;
- 3 ECTS dedicated to seminars for in-depth professionalizing activities;
- 1 ECTS for the assessment of the English language.
3. The third year provides for the acquisition of 55 ECTS divided into:
- 17 ECTS dedicated to the lessons divided into 4 training activities;
- 26 ECTS dedicated to the Internship;
- 2 ECTS dedicated to activities chosen by the student;
- 1 ECTS dedicated to the professionalizing laboratory;
- 3 ECTS dedicated to seminars for in-depth professionalizing activities;
- 6 ECTS for the final exam.

COMPARISON

Taking as a model the minimum credits and the subdivision of the training activities in disciplinary areas and academic discipline described by the interministerial decree of February 19, 2009, we made a comparison using the Microsoft Excel, application of the Office package, and creating a summary table that combined the details of the decree and the ECTS assigned by each university to each academic discipline to compare the general distribution that characterizes the Lombard training offer of the three-year degree course in "biomedical laboratory techniques". In figure 1 it is possible to visualize, for demonstration purposes only, the table completely.

To better describe it, it will be presented in separate tables.

- Figure 2 shows the part of the table including the basic training activities which in the 2009 decree must include at least 22 ECTS from the course study plan;

	ESSENTIAL TRAINING ACTIVITIES (126 ECTS)																						
	Basic training activities (22 ECTS)																						
	Preparatory Sciences (8 ECTS)								Biomedical Sciences (11 ECTS)											First aid (3 ECTS)				
Academic Discipline	FIS / 07	INF / 01	ING-INF / 07	M-DEA / 01	M-PSI / 01	MAT / 05	MED / 01	SPS / 07	BIO / 09	BIO / 10	BIO / 12	BIO / 13	BIO / 16	BIO / 17	MED / 03	MED / 04	MED / 05	MED / 07	BIO / 14	MED / 09	MED / 18	MED / 41	MED / 45
	Applied Physics	Informatics	Electrical and electronic measurements	Demology, Ethnology and Anthropology	General psychology	Mathematical analysis	Medical statistics	General sociology	Physiology	Biochemistry	Clinical biochemistry and clinical molecular biology	Experimental biology	Human anatomy	Histology	Medical genetics	Experimental Medicine and Pathophysiology	Clinical pathology	Microbiology and clinical microbiology	Pharmacology	Internal Medicine	General surgery	Anesthesiology	Nursing
Unimi	4						4		4	9		2	4	2	1	4		3	3				
Unimib	6						4		4	4		3	4	1	3	3		2		3		1	1
Uninsubria	3	2			1	1	1		6	7		1	3	1	2			1	1			1	1
Unibs	3	1	1				3		3	5	3	5	2	2		5		6	2			1	
Unipv	3	1			2		2		3	3		4	4	3				2	1			1	1

Fig. 2 - *Comparison of ECTS basic training activities*

- Figures 3a and 3b describe the distribution of the characterizing training activities which in the 2009 decree must include at least 104 ECTS from the course study plan. The MED / 46 was highlighted: specific academic discipline of the Biomedical Laboratory Technician profile which by decree must count at least 15 ECTS of the study plan (table 2 / a).
- Figure 4 describes the distribution of the activities referred to in this document as "ancillary" (activities chosen by the student / final exam and for the English language / activities such as information technology, seminars / professional laboratories of the specific academic discipline of the profession);
- A last column identifies the "Related or supplementary training activities" type of activity provided for in the inter-ministerial decree of 2 April 2001 "Determination of the classes of university degrees of the health professions" but which in the inter-ministerial decree of 19 February 2009 "Determination of the degree classes of the health professions "are no longer mentioned but are still present in the teaching plan of some universities.

Below table 4 and Figure 5 summarize the distribution of credits in the two training activities. Table 4 also presents a comparison with the minimum of ECTS present in the 2009 decree of 126 ECTS dedicated to indispensable training activities.

Table 5 summarizes the distribution, within the basic training activities, of ECTS by disciplinary areas in relation to the minimums required by the 2009 decree

Table 6 (same table divided into two parts) summarizes the distribution, within the characterizing training activities, of ECTS by disciplinary areas in relation to the minimum required by the decree of 2009

To conclude the analysis of the teaching plans, we compared the implementation by the individual universities of precise indications on the training of the biomedical laboratory technician contained in the inter-ministerial decree of February 19, 2009 "Determination of the degrees of the health professions". In particular, the decree provides that:

Graduates in biomedical laboratory techniques must also acquire knowledge and skills in the field of activity of zooprophylaxis institutes and in the biotechnology sector. [...]

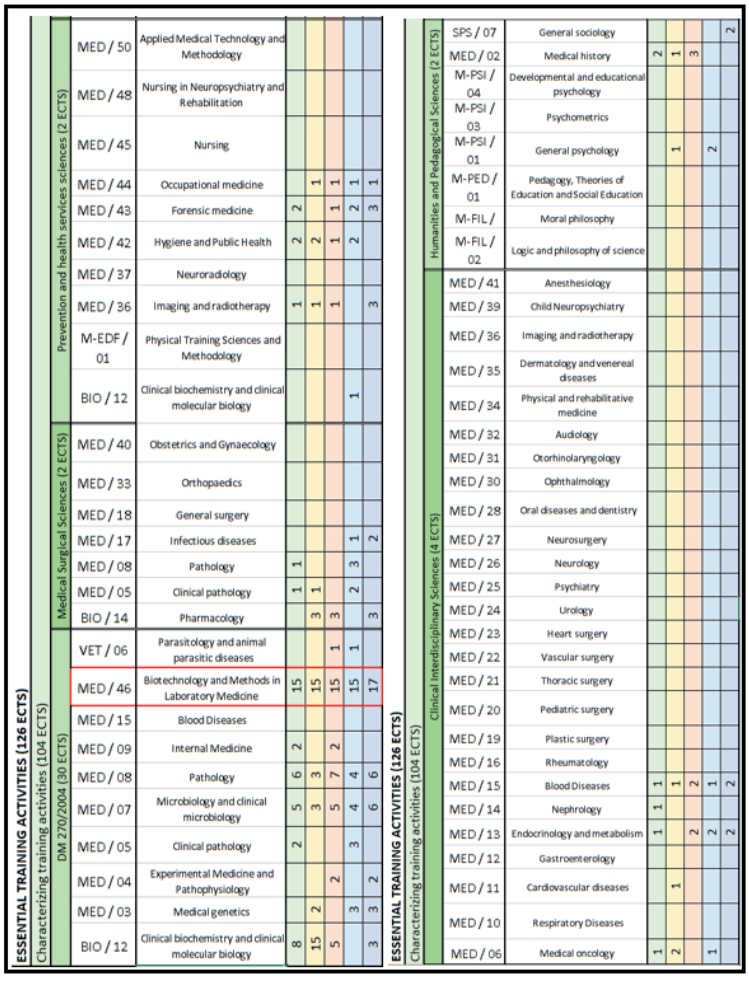

Fig. 3 / a - *Comparison of ECTS characterizing training activities*

Interdisciplinary Sciences (2 ECTS)				Health Management Sciences (2 ECTS)								Internship (60 ECTS)
ING-INF / 05 Information processing systems	ING-INF / 06 Electronic andinformatics bioengineering	L-LIN / 01 Historical and general linguistics	SECS-S / 02 Statistics for experimental and technological research	IUS / 07 Labor law	IUS / 09 Public Law	M-PSI / 05 Social psychology	M-PSI / 06 Work and organizational psychology	SECS-P / 06 Applied economics	SECS-P / 07 Business administration and accounting studies	SECS-P / 10 Organization and human resource management	SPS / 09 Economic sociology and sociology of work and organizations	MED / 46 Biotechnology and Methods in Laboratory Medicine
2								2				60
	2								2			60
2	1			1						1		66
2									2			60
1			2						2	2		60

Fig. 3/ b - *Comparison of ECTS characterizing training activities*

	Basic			Characterizing			TOT ECTS		
Unimi	40	on	22	115	on	104	155	on	126
Unimib	39	on	22	116	on	104	155	on	126
Uninsubria	32	on	22	122	on	104	154	on	126
Unibs	42	on	22	112	on	104	154	on	126
Unipv	30	on	22	122	on	104	152	on	126

Tab. 4 - *ECTS comparison of basic and characterizing training activities*

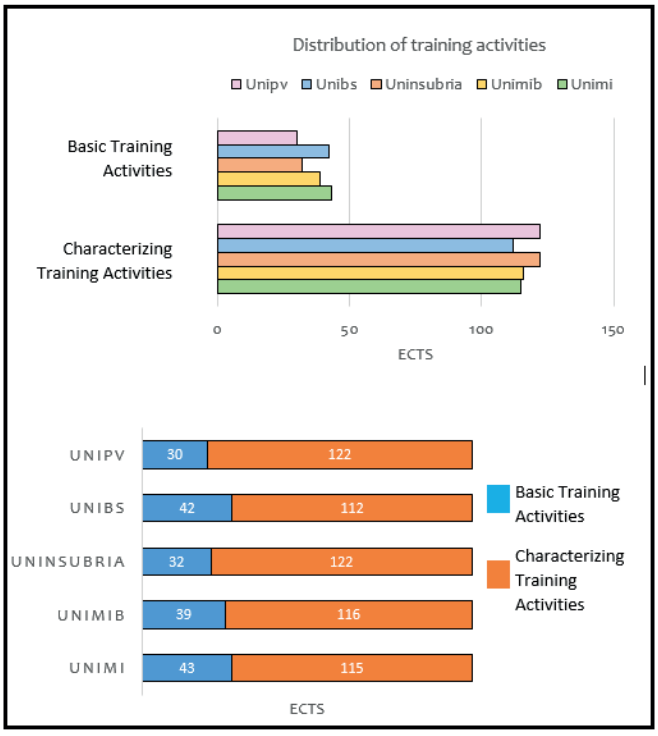

Fig. 5 - *ECTS comparison of basic and characterizing training activities*

	Disciplinary areas									Formative Activities		
University	Preparatory sciences			Biomedical science			First aid			Basic		
Unimi	8	on	8	29	on	11	3	on	3	40	on	22
Unimib	10	on	8	24	on	11	5	on	3	39	on	22
Uninsubria	8	on	8	21	on	11	3	on	3	32	on	22
Unibs	8	on	8	31	on	11	3	on	3	42	on	22
Unipv	8	on	8	19	on	11	3	on	3	30	on	22

Tab. 5 - *Comparison of ECTS subdivision within the basic training activities*

In the didactic systems of the degree classes, didactic activity in the field of radiation protection must be envisaged according to the contents of Annex IV of the legislative decree 26 May 2000, n. 187.

As regards the first request, we analyzed the presence in the didactic plan of the degree course of a module aimed at teaching subjects related to the activities of zooprophylaxis institutes (table 7). The analysis of the presence of activities concerning the biotechnology sector was considered superfluous due to the high presence in the course plans of this kind of activities.

The search for the documents useful for this study has highlighted the excellent service that the Lombard universities offer to users with their institutional sites in providing information relating to the degree course in Biomedical laboratory techniques. The comparative analysis of the teaching plans of the Lombard universities highlighted a substantial uniformity of the regional training offer for the degree course in "Biomedical laboratory techniques" as regards the subjects covered and the academic disciplines involved. Leaving aside the training activities whose number of academic disciplines is defined a priori by the legislation (at the student's choice, final exam and English language, other activities such as computer science and seminars, professional laboratories and training internships in the specific professional profile) and the MED / 46, which we will discuss later, the academic disciplines present in all study plans are, in descending order of ECTS given by the sum of the individual universities: Microbiology and clinical microbiology (MED / 07), Clinical biochemistry and clinical molecular biology (BIO / 12), Pathology (MED / 08), Biochemistry (BIO / 10), Physiology (BIO / 09), Applied Physics (FIS / 07), Human Anatomy (BIO / 16), Pharmacology (BIO / 14), Experimental biology (BIO / 13), Medical Genetics (MED / 03), Medical Statistics (MED / 01), Histology (BIO / 17), Blood Diseases (MED / 15). From an overall analysis of the academic disciplines activated in the Lombardy training offer (considering the table in figure 6), out of a total of 53 academic disciplines with at least 1 ECTS in a single university, the area of Medical Sciences (MED sectors) represents more half (53%) of the credits activated, while the Biological Sciences area (BIO sectors) contributes 18.9% to the Biomedical Laboratory Technician training curriculum. Specific contributions (28.3%) come from academic disciplines (such as computer science, statistics, linguistics, economic, legal and human, physical and mathematical sciences, veterinary) that respond to the demand for skills expected by health services with respect to the Biomedical Laboratory Technician profession. As part of the basic activities, the credits reserved for biomedical sciences are higher than those related to the disciplinary areas of propaedeutic sciences and first aid. As part of the characterizing activities, it is highlighted that among the eight disciplinary areas in which the legislation divides this activity, if the professional internship is excluded, the majority of ECTS is reserved for the disciplinary area of biomedical laboratory sciences and techniques (M.D. 270/2004), as the law provides. The legislation provides that 60 ECTS must be reserved for the training internship in the specific professional profile and only one university in its study plan declares that it assigns a higher number of credits to this activity. From the general analysis it emerges that the credits reserved for the internship activity are gradually inserted into the training course of the three years with a lower number of credits assigned to the first year of the course compared to the other two. According to the regulations in the didactic systems, training activities for the final exam and for the English language must be provided for with a number of ECTS equal to 9; except in one course (which includes 10 credits), all study plans meet this criterion. It should be noted that 6 to 7 credits are assigned to the final exam and that the training activity

	Disciplinary areas											
University	DM 270/2004			Medical Surgical Sciences			Prevention and health services sciences			Clinical interdisciplinary sciences		
Unimi	38	on	30	2	on	2	5	on	2	4	on	4
Unimib	38	on	30	4	on	2	4	on	2	4	on	4
Uninsubria	37	on	30	3	on	2	4	on	2	4	on	4
Unibs	30	on	30	6	on	2	6	on	2	4	on	4
Unipv	37	on	30	5	on	2	7	on	2	4	on	4

Disciplinary areas												Formative Activities		
Human and pedagogical sciences			Interdisciplinary Sciences			Health Management Sciences			Internship			Characterizing		
2	on	2	2	on	2	2	on	2	60	on	60	115	on	104
2	on	2	2	on	2	2	on	2	60	on	60	116	on	104
3	on	2	3	on	2	2	on	2	66	on	60	122	on	104
2	on	2	2	on	2	2	on	2	60	on	60	112	on	104
2	on	2	3	on	2	4	on	2	60	on	60	122	on	104

Tab. 6 - *Comparison of ECTS subdivision within the characterizing training activities*

University	Presence	ECTS	Academic Discipline
Unimi	Yes	1	MED / 36
Unimib	Yes	1	FIS / 07
Uninsubria	Yes	1	MED / 36
Unibs	Yes	1	Seminary
Unipv	Yes	1	MED / 36

Tab. 8 - *Verification of the presence of a teaching of radiation protection*

University	Presence	ECTS	Academic Discipline	Course
Unimi	Yes	2	MED / 46	(Module) Diagnostic techniques of microbiology, virology, mycology and parasitology
Unimib	Yes	1	MED / 46	Parasitic anthropozoonosis
Uninsubria	Yes	1	VET / 06	Anthropozoonosis and hygiene of food of animal origin
Unibs	Yes	1	VET / 06	Parasitology and animal diseases
Unipv	Yes	2	MED / 17	Parasitology

Tab. 7 - *Verification of the presence of teachings related to the activities of zooprophylaxis institutes*

University	Integrated	Singles	
Unimi	21	42	
Unimib	16	54	
Uninsubria	19	59	
Unibs	19	55 *	* not counting the seminars included in the modules
Unipv	19	52	

Tab. 9 - *Number of exams per university*

dedicated to the foreign language is mainly present in the first year. According to the regulations, "Activities chosen by the student", "other activities such as computer science and seminars" and " professional laboratories of the specific academic discipline of the profession" must be provided in the didactic systems of the degree classes with a precise number of ECTS associated with them. From the analysis we observed that in all study plans the credits correspond to what is established by the law, except in a university where 10 out of the 6 required credits are assigned to the "activities chosen by the student". The number of training activities and exams in the various study paths does not show large differences (Table 9).
With regard to the MED / 46 (Biotechnology and Methods in Laboratory Medicine) courses, specific academic discipline of the professional profile of biomedical laboratory technician, the 15 ECTS provided for by the decree of 2009 (excluding the ECTS intended for the internship which, although falling within the MED / 46 academic discipline, is a different educational activity) are strictly respected in all universities except for one which provides 2 credits more. In our opinion, the enhancement of this academic discipline is fundamental in the reality of skills development and specialization that involves, especially in this period, the figure of the Biomedical Laboratory Technician. Assigning more teachings to MED / 46 professors belonging to the professional profile is an added value to the degree course because it allows you to interact with professionals who operate and have work experience in the sector and can transmit practical and theoretical knowledge useful to better understand the professional figure and to guide the students in the work practice. Another criticality highlighted by the analysis is the presence of training activities that can be traced back to the wording "Related or supplementary training activities". Type of activity foreseen in the inter-ministerial decree of 2 April 2001 "Determination of the classes of university degrees of the health professions" but which in the inter-ministerial decree of 19 February 2009 "Determination of the degrees of the health professions" are no longer mentioned in the organization of the course of studies. A revision of these teachings would be necessary by inserting them in the correct academic disciplines expressed by the 2009 decree.

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