UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2025/26
BACHELOR
MEDICAL BIOTECHNOLOGY (Classe L-2 R)
Enrolled in Academic Year 2025/26

HEADING

Degree classification - Denomination and code:	L-2 R
Degree title:	Dottore
Length of course:	3 years
Total number of credits required to complete programme:	180
Years of course currently available:	1st
Access procedures:	Cap on student, student selection based on entrance test
Course code:	DAB

PERSONS/ROLES

Head of Study Programme
Prof.ssa Raffaella Molteni

Head of Interdepartmental Study Programme
Prof.ssa Raffaella Molteni

Tutors - Faculty
Dott.sa Rosaria Bassi - Tutor per stage e tirocini
Prof.ssa Angelisa Frasca- Tutor per l'orientamento
Prof.ssa Anna Silvia Pistocchi - Tutor per le attività elettive
Prof.ssa Federica Compostella - Tutor per la mobilità internazionale e l'Erasmus
Prof.ssa Elena Chiricozzi – Tutor per i tirocini all'estero

Degree Course website
https://biotecnologiemediche.cdl.unimi.it/it

Secretariat 1st, 2nd and 3rd year: Ms Lucia Loseto

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CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The Degree Course in Medical Biotechnology, of which the Department of Medical Biotechnology and Translational Medicine (BioMeTra) is the referent within the Faculty of Medicine and Surgery, aims at preparing graduates in possession of (I) a solid basic chemical-biological preparation, (II) in-depth knowledge in the field of biochemistry, molecular biology, physiology, pathology pharmacology applied to man, (III) of the fundamentals of pathophysiology and diagnostics and of a consistent interdisciplinary knowledge of biotechnological methodologies to be applied to the various fields of biotechnology of medical interest, with particular attention to the research, diagnostic, therapeutic, reproductive, medico-legal sectors, in compliance with the regulations and deontological and bioethical issues.

Through the acquisition of this knowledge, the degree course in Medical Biotechnology aims to prepare a professional figure endowed with good basic and technical-applicative knowledge in the biomedical field, with good scientific, relational and team-working communication skills that will enable him/her to participate in the planning and application of biotechnologies in the biomedical field in close collaboration with other professionals working in this field. To this end, the training pathway is structured with basic, characterising, related and integrative activities that enable the acquisition of a profound understanding of biological systems at the cellular, structural, biochemical and molecular levels in both physiological and pathological conditions, on which is built a solid knowledge of the most recent biotechnological applications in medicine and of the techniques used for this purpose, including omics and bioinformatics approaches, genomic editing, advanced medical therapies. Knowledge of these innovations is not limited to their efficacy and usefulness in the medical sphere but, through the lens of bioethics, is extended to the moral, social and environmental implications arising from them.

In addition to the classroom teaching activities, practical activities are carried out in the University's teaching laboratories, which differ in the methods to be learnt and which may cover the fields of anatomy and histology; cell, applied and molecular biology; biochemistry; genetics; microbiology. These practical activities precede the internship period, which is

carried out in research and care facilities of the Faculty of Medicine, or in non-academic public or private care or research organisations, or companies with a medical biotechnological vocation, even at international level. The internship will be the basis for the drafting of a written paper that the student will have to discuss as the final examination for graduation. In addition, graduates in Medical Biotechnology will be prepared to continue their training or to enter the workplace not only nationally but also internationally, thanks to their ability to use the English language effectively. The organisation of study days and seminars held in English and featuring international guests, the discussion and processing of scientific work in English, and the possibility of spending periods abroad during the training period will foster both understanding and practice of this language.

Expected learning outcomes

During the course, solid knowledge will be acquired in different subject areas, which are considered crucial for the definition of the professional profile of the graduates in this degree programme. Based on this objective, the course is divided into core subjects during the first year and characterising subjects, related subjects and supplementary activities during the following two years.

In particular, basic knowledge will initially be acquired relating to: the mathematical and physical disciplines, which are preparatory to understanding certain biotechnological applications in the health field and the technologies used for this purpose; the chemical disciplines, which are essential for learning the principles of general, inorganic and organic chemistry, which are in turn necessary for understanding the cellular processes that occur in man; the biological disciplines, to acquire those fundamentals of general biology that will be the starting point for understanding the contents of the subsequent characterising and related courses, which include specialised aspects applied to the molecular, molecular and organic biology areas of medicine. To the biological disciplines, in order to acquire the basics of general biology, which will be the starting point for understanding the contents of the subsequent characterising and related courses, which include specialist aspects applied to the medical area of molecular, cellular and applied biology, genetics, human biochemistry, microbiology, physiology and pharmacology.

In addition, an in-depth knowledge of the latest biotechnological techniques will be acquired as tools to analyse and use, including by modifying them, organisms, cells or their components, and to identify, characterise, study, design and/or produce biological molecules and systems. In particular, gene editing using CRISP-Cas9, next-generation sequencing technologies, the production of recombinant proteins and antibodies, cloning techniques and advanced imaging techniques, and their applications in medicine including RNA-based therapies, gene therapy and advanced regenerative medicine therapies, molecular diagnostics and biotechnological drug development will be studied. Finally, the regulations governing medical biotechnology will be learnt, including regulations on clinical trials, management of sensitive data, and ethical guidelines concerning genetic manipulation and experimentation on humans.

The knowledge and understanding of the individual disciplines are assessed individually through the examinations, which may comprise an oral test, a written test with multiple-choice quizzes and/or open-ended questions or a written paper.

The numerous subjects characterised by a high number of CFUs devoted to laboratory exercises and the practical work placement for the preparation of the degree dissertation are a clear expression of the applied nature of the degree. The acquisition of knowledge and skills is only real if it is translated into the concrete application of what has been learnt.

The presence of training activities characterised by multidisciplinary theoretical and methodological approaches and laboratory activities fosters the acquisition of a critical sense that is fundamental for tackling experimental problems and proposing a solution. In particular, the practical training and the preparation of the final exam and other reports are fundamental tools for developing the ability to design experiments, collect and select data, and interpret them in order to arrive at scientific judgements. Finally, the ability to communicate effectively with appropriate language scientific and technical results, both orally and in writing, to specialist and non-specialist audiences, the ability to prepare and present laboratory reports, scientific articles and posters for events or congresses, and the ability to collaborate and work in interdisciplinary teams, actively participating in scientific discussions and research projects will be developed. These are communication skills that will be acquired during the course of study through innovative teaching methods, presentation and discussion of scientific papers, participation in seminar activities, which are an integral part of the educational pathway of the CdL in Medical Biotechnology.

Professional profile and employment opportunities

The graduate in Medical Biotechnology will be able to apply, with defined degrees of autonomy, biotechnological protocols in the medical field and to collaborate in programmes for the development and surveillance of biotechnology applied to humans, taking into account not only the technical aspects but also the ethical, economic and administrative ones.

On this basis, he/she will be able to successfully enter the relevant working environments in national and international contexts, possessing appropriate technical-scientific skills, also pertaining to communication and information management, and being able to adequately use the English language.

The skills acquired by Medical Biotechnology graduates can be applied in the following work contexts:

- National Health System structures, hospital companies, public and private specialised clinical analysis laboratories;
- Universities and other public and private research institutes and bodies;
- Pharmaceutical and biotechnology industries;
- Research and development centres for biotechnological diagnostic products in the health area;
- Biotechnology service centres in the medical area;
- Bodies in charge of drawing up health or patent regulations concerning the exploitation of biotechnological products for the protection of human health.

The specific role and professionalism of the Medical Biotechnology graduate according to the nomenclature and classification drawn up by ISTAT is that of Biochemical Laboratory Technician (3.2.2.3.1).

Initial knowledge required

Candidates with a high school diploma or an equivalent foreign qualification in accordance with Ministerial Decree n.270 of 22 October 2004 may be admitted to the Degree Course in Medical Biotechnology. Access to the Course is programmed locally and limited to 120 students + 5 non-EU students residing abroad. They will be selected on the basis of the results of a selective test that must be taken prior to enrollment.

The course adheres to the on-line test system of type S (TOLC-S) prepared at national level by the Interuniversity Consortium Integrated Systems for Access (C.I.S.I.A.). The date of the selective test and the methods for determining the merit list for access to the Degree Course in Medical Biotechnology will be defined in the announcement of competition.

Additional educational obligations and methods for recovery (OFA)

Freshmen who do not achieve a score greater than or equal to 10 in the Basic Mathematics module of the TOLC-S will be assigned Additional Educational Obligations (OFA). For students with OFA, support activities will be organized in the period October-December, followed by a remedial test with which the student must demonstrate that he/she has improved his/her preparation. Those who have not reached the required objectives will not be able to take the Mathematics exam.

Admission to years subsequent to the first and cases of exemption from the test

Students who intend to transfer to the degree course in Medical Biotechnology or those who already have a degree, are still required to take the test and achieve a useful position in the ranking for the purposes of enrollment. The presentation of any previous career, subject to evaluation by the Board of Education and within the limit of available seats for each year programmed at the University level under Law n.264 of 02.08.199, may allow to be admitted to years after the first.

An exception is made for students and graduates of the class L-2 of the University of Milan (degree in Biotechnology) who may be admitted to years subsequent to the first, always in compliance with the limits of the law reported, and therefore exempt from the test, provided that they comply with the requirements, the procedure and the deadlines indicated in the call for admission.

Compulsory attendance

Attendance is compulsory for all teaching activities, with a tolerance of no more than 30% of the hours. Therefore, students are required to declare their attendance at each educational activity when it is recorded by the lecturers.

Internship criteria

The internship activity plays a fundamental role in the training process and will take place at university facilities or other research institutions including hospitals affiliated with the University. The internship activity will be carried out starting from the beginning of the second semester of the third year and is subject to the achievement of all the exams of the courses related to the first and second year of the course. Validation of the practical application internship is subject to the positive judgment of the head of the laboratory where the student performed the activity. The internship will provide the basis for the preparation of a written paper that the student will then have to discuss in the final examination for the degree.

Degree programme final exams

The degree in Medical Biotechnology is obtained by passing a final exam, which consists of the presentation and discussion of a written paper related to the practical-application activity carried out during the training period. The results obtained, which will be described and interpreted in the written paper, will be presented on the day of graduation to a Commission, composed of the President of the Degree Course, teachers belonging to the Degree Course and/or pertaining to the Faculty of Medicine or external experts who coordinated the practical traineeship activities.

The candidate presents his/her final paper in 10 minutes, highlighting the purpose of the work he/she has carried out, the procedures he/she has used, the results he/she has obtained and the skills he/she has acquired.At the end of the presentation, the candidate answers any questions and remarks from the Commission relating to the work carried out.The Commission shall express its opinion on the degree grade, expressed as 110 points out of 110, reflecting both the curriculum of studies and the thesis training and the preparation and presentation of the paper. Specifically, the points deriving from the curriculum of studies correspond to the weighted average of exam marks calculated by summing the marks normalised to the number of CFUs acquired in that course (each mark is multiplied by the ratio of the CFUs of the corresponding course to the total CFUs) and expressed as 110 out of 110 points.

Additional points may be added to this value from the evaluation of the traineeship and the defence of the thesis. In particular, additional points up to a maximum of 8 may be proposed by the thesis supervisor and the co-rapporteur on the basis of the commitment, interest and autonomy achieved during the placement and the writing of the thesis, while the remaining part of the Commission may propose a score of up to a maximum of 2 points on the basis of the presentation and discussion of the results obtained. The Commission will express a judgement that will take into account the student's entire study pathway, including participation in Erasmus+ mobility projects.In particular, for students who have carried out their thesis work entirely abroad, the Commission may award up to one (1) additional point on the basis of the comments received from the foreign supervisor and the quality of the work carried out.

The awarding of honours is subject to the unanimous assessment of the Commission, which takes all elements into account.

In order to be admitted to the degree examination, which entails the acquisition of 4 CFUs, the student must have obtained the 176 credits stipulated in the study plan.

Campus

Location of the Degree Course at the Didactic/Scientific Pole LITA Segrate - via F.lli Cervi, 93 - Segrate (MI)

The didactic activities of the first semester of the first year are carried out at the didactic facilities located in the Città Studi

area, while from the second semester onwards they take place at the LITA Scientific Educational Pole (Segrate), the site of the second and third year classes.
Traineeships may take place at facilities belonging to the Faculty of Medicine or outside, equipped with modern scientific and welfare facilities, with a high degree of expertise in the field of biotechnology applied to the medical sciences.

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM

The University of Milan supports international mobility by providing its students with the opportunity to spend study and internship periods abroad. It is a unique chance to enrich your educational path in a new exciting environment.

The agreements entered into by the University with over 300 universities from the 27 EU member countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organisations.

Similar international mobility opportunities are provided outside Europe, through agreements with a number of prestigious institutions.

The University of Milan is a member of the 4EU+ European University Alliance that brings together eight public multidisciplinary universities: University of Milan, Charles University of Prague, Heidelberg University, Paris-Panthéon-Assas University, Sorbonne University of Paris, University of Copenhagen, University of Geneva, and University of Warsaw. The 4EU+ Alliance offers integrated educational pathways and programmes to promote the international mobility of students (physical, blended and virtual).

Study and internships abroad

The Degree programme in Medical Biotechnology supports cooperation opportunities and mobility with leading international universities, as well as the possibility for students to earn credits through exchange education and training programmes with Partner organizations.

In order to achieve Erasmus+, bilateral agreements are in place with the Catholic University of Leuven (Katolieke Universiteit Leuven, Belgium), the University of Lleida (Universitat de Lleida, Spain), the LUMC (Leids Universitair Medish Centrum) of the University of Leiden (The Netherlands) and the University of Cantabria in Santander (Spain). At these locations, it is possible to carry out - during the third year of the course - practical training in the laboratory, living an experience that enriches their training with a European dimension.

In recent years, a growing number of students have developed their professionalism and the European dimension of their training through residence periods abroad. Associated Universities represent highly recognized European institutions, featuring reference schools in biomedical sciences. The students will thus be offered exciting opportunities to enhance their CVs and evaluate their interest in extending their careers in an international setting.
The period abroad amounts to max. 3 months equivalent to 14 credits (8 CFUs from the practical side, + 6 CFUs from elective activities). A positive evaluation of the period abroad is required. The latter is defined by the tutor in the foreign university, the Unimi tutor and is subjected to the approval by the Unimi Didactic Council.
Besides general informative meetings organized by the University, the Degree course in Medical Biotechnology provides specific support to interested/selected students through the organization of specific informative session and/or meeting with the tutor for mobility.

How to participate in Erasmus mobility programs

How to participate in Erasmus+ mobility programmes

The students of the University of Milan can participate in mobility programmes, through a public selection procedure.
Ad hoc commissions will evaluate:
- Academic career
- the candidate's proposed study programme abroad
- his/her foreign language proficiency
- the reasons behind his/her application

Call for applications and informative meetings
The public selection for Erasmus+ mobility for study generally begins around February each year with the publication of a call for applications specifying destinations and requirements. Regarding the Erasmus+ Mobility for Traineeship, the University of Milan usually publishes two calls a year enabling students to choose a destination defined by an inter-institutional agreement or to find a traineeship position on their own.

The University organises informative meetings to illustrate mobility opportunities and rules for participation.

Erasmus+ scholarship
The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility

costs, which may be supplemented by the University funding for disadvantaged students.

Language courses
Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University Language Centre (SLAM).
https://www.unimi.it/en/node/8/

Learn more at https://www.unimi.it/en/node/274/

For assistance, please contact:
International Mobility Office
Via Santa Sofia 9 (second floor)
Tel. 02 503 13501-12589-13495-13502
Contacts: InformaStudenti;
Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common

Learning activity		Ects	Sector
Applied physics		9	FIS/07
General and cellular biology		7	BIO/13
General and inorganic chemistry		8	CHIM/03
Genetics		7	BIO/13
Human anatomy and histology		7	(3) BIO/17, (4) BIO/16
Mathematics		6	MAT/05
Organic chemistry		8	CHIM/06
	Total compulsory credits	52	

2nd COURSE YEAR (available as of academic year 2026/27) Core/compulsory courses/activities common

Learning activity		Ects	Sector
Biochemistry and fundamentals of human biochemistry		11	BIO/10
Bioethical and legal issues in biotechnology		9	(3) MED/02, (3) IUS/01, (3) AGR/01
General pathology and immunology		10	MED/04
Human molecular genetics		6	(2) MED/03, (4) BIO/13
Human physiology		7	BIO/09
Microbiology and medical virology		6	MED/07
Molecular biology		8	BIO/11
Techniques in molecular and cellular biology		10	(5) BIO/10, (5) BIO/13
	Total compulsory credits	67	

3rd COURSE YEAR (available as of academic year 2027/28) Core/compulsory courses/activities common

Learning activity		Ects	Sector
Applications of biotech on medicine		7	(1) MED/40, (2) MED/46, (1) MED/44, (1) MED/43, (1) MED/08, (1) MED/42
Biotechnologies in molecular diagnostics and fundamental of statistics		9	(1) MED/50, (3) MED/01, (2) MED/05, (3) BIO/12
Medical pharmacology		10	BIO/14
Physiopathology, introduction in biotechnologies diagnostic and therapy		9	(1) MED/13, (2) MED/15, (2) MED/09, (1) MED/26, (1) MED/18, (2) MED/06
	Total compulsory credits	35	

Further elective courses

English proficiency B2 (2 ECTS)		2	ND

End of course requirements

Final examination		4	ND
Training		8	ND
	Total compulsory credits	12	

COURSE PROGRESSION REQUIREMENTS

The undergraduate Degree Course in Biotechnology requires compulsory propaedeutical exams listed in table. For each of the learning activities which require propaedeutical exams, the student must take the examination of propaedeutical courses (right column) before taking the exam on courses for which there are specific prerequisites (left column).

Learning activity	**Prescribed foundation courses**	**O/S**
Physiopathology, introduction in biotechnologies diagnostic and therapy	General pathology and immunology	Core/compulsory
	Human physiology	Core/compulsory
	Biochemistry and fundamentals of human biochemistry	Core/compulsory
General pathology and immunology	General and cellular biology	Core/compulsory
	Genetics	Core/compulsory
Human physiology	Human anatomy and histology	Core/compulsory
	Applied physics	Core/compulsory
Human molecular genetics	Techniques in molecular and cellular biology	Core/compulsory
	Molecular biology	Core/compulsory
Microbiology and medical virology	General and cellular biology	Core/compulsory
Techniques in molecular and cellular biology	General and cellular biology	Core/compulsory
	Genetics	Core/compulsory
Biochemistry and fundamentals of human biochemistry	Organic chemistry	Core/compulsory
	General and inorganic chemistry	Core/compulsory
Molecular biology	General and cellular biology	Core/compulsory
	Genetics	Core/compulsory
Applications of biotech on medicine	General pathology and immunology	Core/compulsory
	Human molecular genetics	Core/compulsory
	Techniques in molecular and cellular biology	Core/compulsory
Biotechnologies in molecular diagnostics and fundamental of statistics	General pathology and immunology	Core/compulsory
	Techniques in molecular and cellular biology	Core/compulsory
	Biochemistry and fundamentals of human biochemistry	Core/compulsory
Medical pharmacology	General pathology and immunology	Core/compulsory
	Human molecular genetics	Core/compulsory
	Biochemistry and fundamentals of human biochemistry	Core/compulsory