# UNIVERSITA' DEGLI STUDI DI MILANO
# PROGRAMME DESCRIPTION - ACADEMIC YEAR 2022/23
# BACHELOR
## Medical Biotechnology (Classe L-2)
## Enrolled from 2014/15 Academic Year

| *HEADING* | |
|---|---|
| **Degree classification - Denomination and code:** | L-2 Biotechnologies |
| **Degree title:** | Dottore |
| **Length of course:** | 3 years |
| **Total number of credits required to complete programme:** | 180 |
| **Years of course currently available:** | 1st , 2nd , 3rd |
| **Access procedures:** | Cap on student, student selection based on entrance test |
| **Course code:** | D47 |

## *PERSONS/ROLES*

**Head of Study Programme**

Prof.ssa Raffaella Molteni

**Tutors - Faculty**

Dott.sa Rosaria Bassi - Tutor per laboratori e altre attività
Prof.ssa Anna Marozzi- Tutor per l'orientamento
Prof.ssa Federica Compostella - Tutor per la mobilità internazionale e l'Erasmus
Prof.ssa Anna Silvia Pistocchi - Tutor per le attività elettive

**Degree Course website**

https://biotecnologiemediche.cdl.unimi.it/it

**Student secretary I°, II° and III° year: Mrs Lucia Loseto**

Dipartimento di Biotecnologie Mediche e Medicina Traslazionale sede di via Vanvitelli, 32 Phone 02/50317123
https://biotecnologiemediche.cdl.unimi.it/it Email: biotecnologie.mediche@unimi.it

**Link to degree course regulations**

https://biotecnologiemediche.cdl.unimi.it/it/il-corso/biotecnologie-mediche

## *CHARACTERISTICS OF DEGREE PROGRAMME*

**General and specific learning objectives**

The course offers a solid grounding in chemistry-biology; an excellent basis in the fields of biochemistry, molecular biology, physiology, pathology, applied human pharmacology; knowledge of the foundations of physiopathology and diagnostics; and a solid interdisciplinary understanding of the biotechnological methodologies used in the different fields of biotechnologies with medical uses. A particular focus is placed on the research, diagnostic, therapeutic, reproductive, forensic sectors, in compliance with regulations and taking into account ethical and bioethical issues.

The degree program prepare a professional figure with a good basic knowledge in molecular biomedical and technical practices, and skills in modern communication techniques, which allow to collaborate in the planning and implementation of biotechnological applications to man.

**Expected learning outcomes**

The graduated students in Medical Biotechmology will master knowledge and skills in each of the following field
the application of biotechnological techniques to support biomedical research and molecular diagnostics (DNA sequencing, PCR, in-situ hybridisation)
the production of vectors for experimental and gene therapy purposes
cell culture generation and maintenance
the generation of engineered cells for diagnostic and curative treatments
the generation of transgenic animals for the production of therapeutic proteins or xenografts
assistance with clinical trials of biotechnological medicines
assistance with the optimisation and personalisation of pharmacological therapy
the application of genomic medicine principles
clinical monitoring of biotechnological medicines

the application and development of biotechnology-based diagnostic tests; biotechnological trials and analyses
technical and scientific information in the biotechnological field.

**Professional profile and employment opportunities**

The programme is designed to prepare students capable to apply biotechnology protocols in the medical field and to collaborate on development programs and surveillance of biotechnologies applied to man considering also ethical, economic, and administrative aspects.
Medical Biotechnologies graduates can pursue careers in:
Universities and other public and private research bodies
National Health Service organisations, hospitals, specialist public and private laboratories
Pharmaceutical and biotechnological companies
Research and development centres for biotechnological diagnostic products in the health sector
Biotechnological service centres
Bodies in charge of drafting health and patent regulations regarding the utilisation of biotechnological products for the protection of human health

**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 mandatory for all taught courses and all internship activities.

**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 (except the Mathematics exam) and second year of the course, equivalent to 119 ECTS. 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. The final exam consists in the presentation and discussion of a written paper related to the practical-application activity carried out during the training period. In order to be admitted to the graduation exam, which involves the acquisition of 4 ECTS, the student must have obtained 176 credits required by the study plan. The graduation grade is expressed in 110 points out of 110. The points deriving from the curriculum of studies correspond to the weighted average of the exam grades. The weighted average is based on the summation of the exam grades multiplied by the ECTS of the corresponding course/total ECTS, and is stated 110 out of 110 marks.

**Campus**

Location of the Degree Course at the Didactic/Scientific Pole LITA Segrate - via F.lli Cervi, 93 - Segrate (MI)
The didactic activities related to the first semester and to the second semester of the second and third year take place at the Scientific Educational Pole LITA-Segrate, while the didactic activities of the first semester of the first year are carried out at the didactic facilities located in the Città Studi area. Starting from the second semester of the first year, the teaching activities

are carried out at the LITA-Segrate Scientific Campus and at other facilities, also acquired by agreement with public and private non-university organizations, available to the Faculty of Medicine. These facilities, equipped with modern scientific and welfare equipment, and with high-level skills in biotechnology applied to medical sciences, are also used for internships and activities related to the final degree test.

## *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 organizations.

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

**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.
Bilateral agreements with the University of Leuven (Katolieke Universiteit Leuven, Belgium) ), the University of Lleida (Universitat de Lleida, Spain) and the LUMC (Leids Universitair Medish Centrum) of the University of Leiden (Netherland) are active in the framework of the Erasmus + programme. 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 Degree course in Medical Biotechnology offers third year students the possibility to carry out practical training for the preparation of their final thesis work in one of the aforementioned institutions. 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 organizes 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; mobility.out@unimi.it
Student Desk booking through InformaStudenti

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|---|---|---|---|
| ***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/03 |
| Organic chemistry | | 8 | CHIM/06 |
| | Total compulsory credits | 52 | |
| ***Elective courses*** | | | |
| | | | |
| ***2nd COURSE YEAR 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 | MED/02, IUS/01, AGR/01 |
| General pathology and immunology | | 10 | MED/04 |
| Human molecular genetics | | 6 | MED/03, 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 Core/compulsory courses/activities common*** | | | |
| **Learning activity** | | **Ects** | **Sector** |
| Applications of biotech on medicine | | 7 | MED/40, MED/46, MED/44, MED/43, MED/08, MED/42 |
| Biotechnologies in molecular diagnostics and fundamental of statistics | | 9 | (4) MED/01, (5) MED/05, (4) MED/36, (5) BIO/12 |
| Medical pharmacology | | 10 | BIO/14 |
| Physiopathology, introduction in biotechnologies diagnostic and therapy | | 9 | (5) MED/13, (5) MED/15, (5) MED/09, (4) MED/26, (4) MED/18, (4) MED/06 |
| Training | | 8 | ND |
| | Total compulsory credits | 43 | |
| ***Elective courses*** | | | |
| | | | |
| ***End of course requirements*** | | | |
| Final examination | | 4 | NA |
| | Total compulsory credits | 4 | |

## *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** |
|---|---|---|
| Biochemistry and fundamentals of human biochemistry | General and inorganic chemistry | Core/compulsory |
| | Organic chemistry | Core/compulsory |
| Physiopathology, introduction in biotechnologies diagnostic and therapy | Biochemistry and fundamentals of human biochemistry | Core/compulsory |
| | General pathology and immunology | Core/compulsory |
| | Human physiology | Core/compulsory |
| Molecular biology | General and cellular biology | Core/compulsory |

| | | |
|---|---|---|
| | Genetics | Core/compulsory |
| Techniques in molecular and cellular biology | General and cellular biology | Core/compulsory |
| | Genetics | Core/compulsory |
| Human molecular genetics | Molecular biology | Core/compulsory |
| | Techniques in molecular and cellular biology | Core/compulsory |
| Medical pharmacology | Biochemistry and fundamentals of human biochemistry | Core/compulsory |
| | Human molecular genetics | Core/compulsory |
| | General pathology and immunology | Core/compulsory |
| Biotechnologies in molecular diagnostics and fundamental of statistics | Biochemistry and fundamentals of human biochemistry | Core/compulsory |
| | Techniques in molecular and cellular biology | Core/compulsory |
| | General pathology and immunology | Core/compulsory |
| Applications of biotech on medicine | Techniques in molecular and cellular biology | Core/compulsory |
| | Human molecular genetics | Core/compulsory |
| | General pathology and immunology | Core/compulsory |
| General pathology and immunology | General and cellular biology | Core/compulsory |
| | Genetics | Core/compulsory |
| Microbiology and medical virology | General and cellular biology | Core/compulsory |
| Human physiology | Human anatomy and histology | Core/compulsory |
| | Applied physics | Core/compulsory |