UNIVERSITA' DEGLI STUDI DI MILANO
MANIFESTO DEGLI STUDI A.A. 2025/26
LAUREA MAGISTRALE IN
BIOINFORMATICS FOR COMPUTATIONAL GENOMICS (Classe LM-8)
Enrolled from 2019/2020 to 2024/2025 academic year

GENERALITA'	
Classe di laurea di appartenenza:	LM-8 Classe delle lauree magistrali in Biotecnologie industriali
Titolo rilasciato:	Dottore Magistrale
Durata del corso di studi:	2 anni
Crediti richiesti per l'accesso:	180
Cfu da acquisire totali:	120
Annualità attivate:	2°
Modalità accesso:	Programmato
Codice corso di studi:	F4B

RIFERIMENTI

Presidente Collegio Didattico

Prof. Federico Zambelli

Docenti tutor

Students can contact, according to their needs, tutors from both University of Milan and Politecnico di Milano:

Academic guidance tutor: Giulio Pavesi (Unimi), Marco Masseroli (Polimi)
Erasmus and international mobility tutor: Matteo Chiara (Unimi)
Study plan tutor: Roberto Mantovani (Unimi)
Internship tutor: Roberto Mantovani (Unimi)
Seminar and workshop tutor: Giulio Pavesi (Unimi), Marco Masseroli (Polimi)
Dissertation tutor: Roberto Mantovani (Unimi), Marco Masseroli (Polimi)
University and programme transfer tutor: Matteo Chiara (Unimi)
Master's degree admission tutor: Giulio Pavesi (Unimi), Marco Masseroli (Polimi)
Credit recognition tutor: Giulio Pavesi (Unimi), Marco Masseroli (Polimi)

Sito web del corso di laurea

http://bcg.cdl.unimi.it

Email: bcgenomics@unimi.it

Academic Services Office

via Celoria, 26 - 20133 Milan - ground floor, C Building Tel. 0250314870 By appointment. https://informastudenti.unimi.it/saw/ess?AUTH=SAML

Student Desks

via Celoria, 18 - 20133 Milan Tel. 0250325032 https://www.unimi.it/en/node/360 https://www.unimi.it/en/node/359

CARATTERISTICHE DEL CORSO DI STUDI

Obiettivi formativi generali e specifici

The Master Degree in 'Bioinformatics for Computational Genomics' (BCG) aims to form graduates with an adequate knowledge about the molecular basis of biological systems; the structure and function of biological molecules and how they participate in cellular processes; the technologies and platforms for the analysis of genomes; the tools for bioinformatic and genomic analysis; and the statistical and computational methodologies for the analysis of biomolecular data.

The BCG degree therefore includes activities providing in depth knowledge on:
1. the organization of information in the genome and the molecular and cellular processes at the basis of gene expression and its regulation
2. the experimental methods used for studying genes and their function in different model species, both prokaryotic and eukaryotic
3. the technologies employed in modern genomic research

4. methods and protocols of bioinformatic analysis in functional genomics studies
5. algorithmic, mathematical and statistical approaches underlying bioinformatic and genomic analysis tools
6. data base technologies for the storage and organization of the data
7. modelling and analysis techniques employed in systems biology for the study of interactions in complex biological systems.

The program includes, as a fundamental step in the formation of the students, an internship in research laboratories either at the University of Milan or in other Italian or foreign research institutes. The research experience of the internship and its results will be described in a final written dissertation, to be discussed in front of a thesis committee.

Risultati di apprendimento attesi

Knowledge and understanding

Graduates in BCG will acquire an in depth knowledge allowing them to apply a multidisciplinary and computational approach to solving complex problems in the fields of biology and biotechnology. The degree aims at providing integrated knowledge on different fields of chemistry and biology, which represent the foundations for a Master degree in the class of Biotechnology. The BCG Master degree aims in particular at providing solid inter-disciplinary knowledge for the development and application of computational tools for bioinformatic and genomic analysis.

Applying knowledge and understanding

A fundamental objective of the Master degree in BCG is to provide students with the ability of applying the knowledge acquired. This aim will be achieved both with class contents and with the final internship in a research laboratory. Suitable teaching time will thus be devoted to problem solving and to activities that will augment the analytical and methodological skills of the students. The skills acquired in classes on fundamental topics will be applied to the design and development of bioinformatic tools for genomic, transcriptomic, epigenomic, and systems biology studies.

Autonomy / judgment (Making judgments)

The acquisition of autonomous skills for making judgements will be made possible by the teaching methods employed in classes and the respective topics. The latter ones will often refer to relevant problems and research lines in different areas, and will include problem solving activities that will take place during classes or the development of projects to be discussed at exams. The usage of teaching material alternative to textbooks (research articles, on line tutorials and videos) will be encouraged, in order to make students acquire notions with a proactive and autonomous approach.

Communication skills

Communication skills can be defined as the acquisition of tools and knowledge for scientific communication using the English language; skills in computing for the elaboration, presentation, and discussion of experimental data; being able to work autonomously, and being able to communicate the results of one's activities to others in seminars, journal clubs, etc. The acquisition of these skills will be included in classes and in the experimental laboratory activities leading to the final dissertation (reading and discussion of scientific literature; reading and discussion of analysis protocols; elaboration and discussion of experimental data).

Learning skills

Learning skills can be defined as the development of suitable skills for the acquisition of novel knowledge, also through retrieval and study of scientific articles in English or access to databases and retrieval of information. These skills will be acquired during the experimental laboratory activities leading to the final dissertation, or the reading and discussion of scientific literature during classes or exams. These activities will allow students to learn through a 'hands on' approach and through the constant interaction both with their peers and the instructors.

Profilo professionale e sbocchi occupazionali

The BCG Master degree aims to train highly skilled professionals able to merge in depth knowledge on the molecular foundations of life sciences with up-to-date knowledge of the current techniques and technologies for bioinformatic and genomic analysis. Particular emphasis will be put on the quantitative and computational aspects of the latter ones, which will be focused on the analysis, modelling, and comprehension of biological systems. The ultimate goal is to train in a multi-disciplinary context professionals ready to cope with the challenges deriving from modern biomolecular sciences in the post-genomic era, and able to conjugate and integrate knowledge on biology, genetics, computer science, information engineering, and statistics in different fields of basic or applied research. The BCG program aims to train the following professional figures: biologist and related figures, biotechnologist.

Graduates in BCG will thus be able to:

1. take part in the design and execution of large scale genomic analyses
2. identify and extract the biological meaning from the results obtained
3. design autonomously tools and protocols for the bioinformatic analysis of different types of experimental data
4. play a pivotal role in research groups focused on basic or applied genomic research
5. coordinate and supervise research projects and groups focused on bioinformatics and genomics.

Conoscenze per l'accesso

Italian Students:
Students can apply to the BCG Master degree course, provided that they satisfy one of the following two requirements:

1. they have completed a bachelor degree program (Laurea Triennale) in one of the following classes:
- Biotechnology (class L2);
- Biology (class L13);
- Agriculture and Food Sciences (class L26);
- Pharmacological Sciences (class L29);
and during their studies they have acquired at least 30 CFU in biological areas (SSD BIO/01-19) with at least 18 CFU in Genetics (BIO/18), Molecular Biology (BIO/11) and Biochemistry (BIO/10)

OR

2. they have completed a bachelor degree program (Laurea Triennale) in one of the following classes:
- Information Engineering (class L8);
- Physics (class L30);
- Computer Sciences (class L31);
- Mathematics (class L35);
- Statistics (class L41).

and during their studies they have acquired at least 30 CFU in the areas of computer science, information engineering, biomedical engineering, mathematics and/or statistics (SSD INF/01, ING-INF/05, ING-INF/06, MAT/01-09, and/or SECS-S/01), with at least 6 CFU in mathematics (MAT/01-09) and at least 12 CFU in one or more of the following areas: computer science (INF/01), information engineering (ING-INF/05), biomedical engineering (ING-INF/06), statistics (SECS-S/01).

The same criteria are applied to candidates in possession of foreign university degrees, deemed to be suitable by the Teachers Council, in which it is possible to clearly identify disciplines and number of credits acquired for each discipline (1 CFU = 1 ECTS - European Credit Transfer and Accumulation System). If this is not possible, the documents certifying the career of the candidates will be examined in detail by the Teachers Council in order to assess if their background complies with the previous requirements.

Foreign Students
Students in possession of a Bachelor degree in an area of those described at the previous point (Admission for Italian Students), where courses taken in the required disciplines can be clearly identified together with the amount of hours/credits of the courses. If this is not possible, the documents certifying the career of the students will be examined by the Teachers Council in order to assess if their background complies with the previous requirements.

Language Requirements
Students must be proficient in English, with a B2 level of competence. In exceptional cases, students without a valid language certificate may be accepted on condition that their level of English proficiency, assessed during the interview, is evidently good. The adequate personal preparation of the candidates, their ability to communicate in English and their motivation are decisive elements for the admission and they are going to be verified and tested during the admission interview.
Knowledge of Italian is not required for attendance, nor for graduation. Foreign students are however encouraged to acquire basic knowledge of the Italian language before the final dissertation, by attending one or more than one 60-hour Italian courses organized by the University Language Centre/Slam

BACKGROUND KNOWLEDGE
The prerequisite to access the BCG Master degree program is an adequate knowledge of the fundaments of either (1) genetics, molecular biology and biochemistry or (2) computer science, information engineering and mathematics.

This will be verified through 1) evaluation of the bachelor study program and 2) direct assessment of candidate scientific background knowledge.

Evaluation of the bachelor study program
EU students satisfying the above criteria will be admitted to an interview for the assessment of their scientific background knowledge. Non EU students resident abroad will be evaluated only according to their previous bachelor study program.

Interview for direct assessment of candidate scientific background knowledge
The candidate's background knowledge will be verified by an interview with the Commission for Admittance to the Master, composed by teaching members appointed by the Teaching Board. The interview will evaluate the expertise of the candidates in topics related to their bachelor degree.

The committee will evaluate each applicant on a 100-point scale:
1) Up to 50/100 points will be awarded for the applicant resume (type of bachelor degree attended, exam grades, further courses attended, additional degrees, etc.)
2) Up to 50/100 points will be awarded for the interview.

Non EU students resident abroad will be awarded up to 100 points for their resume only (type of bachelor degree attended, exam grades, further courses attended, additional degrees, etc.).

The minimum score required for admission is 60/100.

Admission results for both EU and non-EU students will be published together at the end of the admission procedure.

Struttura del corso

The BCG Master degree is a 2-year course; each year is divided in two terms (semesters). The program includes different activities, such as frontal lectures, practical classes, and an experimental project leading to the final dissertation. 120 educational credits (CFU, Crediti Formativi Universitari) are required to complete the Master degree.

A CFU corresponds to a standard student workload of 25 hours, and it is calculated as follows:
- for frontal lectures, 1 CFU = 8 hours of lectures and 17 hours of personal elaboration
- for practical classes, 1 CFU = 16 hours of laboratory activities and 9 hours of personal elaboration
- for experimental projects, 1 CFU = 25 hours of laboratory and/or training activities.

Students will acquire 84 CFU from 11 mandatory courses, scheduled in the first and second year, and a minimum of 12 CFU that can be freely chosen. At least 6 CFU out of these 12 CFU must be acquired through attendance of a course (and passing the exam): the course can be chosen either from the list of the BCG elective courses or from any course offered by the University of Milan or the Politecnico di Milano, as long as it is considered consistent with the aims of the BCG degree and is not a repetition of courses already offered by the degree program. For the Academic Year 2024-2025 the following elective courses will be available for students:

- Genomic Big Data Management and Computing
- Interdisciplinary Project
- Neurogenomics and Brain Disease Modelling

Students can also choose courses and classes taught in Italian as freely chosen CFU. 6 CFU can be acquired by additional laboratory activity, (namely, an extension of the thesis period) upon submission of a written request and thesis project that must be approved by the BCG Study Plan Committee.

21 CFU are assigned to the individual experimental project leading to the final dissertation, to be started in the second year. Finally, 3 CFU will be assigned for knowledge of the English language, or of the Italian language for foreign students, or for other activities like attending seminars from invited experts and scientists.

In the first semester of the first year the student will follow a course plan that will be assigned by the Teaching Board upon admission, depending on the student’s background and degree(s) previously acquired:

- Students with a degree/background in computer science, engineering, mathematics or physics will attend the courses of the “Percorso 1” (“Knowledge Alignment Plan 1”) in Genetics, Cellular and Molecular Biology (12 CFU) and Biochemistry (6 CFU).

- Students with a degree/background in life sciences (biology or biotechnology or equivalent) will attend the courses of the “Percorso 2” (“Knowledge Alignment Plan 2“) in Programming and Data Bases (12 CFU) and Statistics (6 CFU).

All the other mandatory courses will be common to all students, regardless of their previous degree/background.

Obiezione di coscienza

In the BCG Master degree the use of animals for teaching purposes is not allowed as stated by the law: art. 5f of the Legislative Decree 26/2014. Such procedures are allowed during the traineeships for thesis preparation. However, they must be carried out exclusively by authorized staff, since, in this case, the Legislative Decree 26/2014 does not apply. According to Italian law n. 413, October 12 1993, “Norme sull’obiezione di coscienza alla sperimentazione animale”, students have the uncontestable right to conscientiously object to participation in any experimental activity using animals. In this case, the Teaching Board will suggest alternative traineeships, which are consistent with the educational goals of the BCG course, to ensure the correct acquisition of the study credits necessary for degree completion.

Area didattica

Lecture rooms and laboratories are located:
- in the “Città Studi” campus of the University of Milan, mostly in the University buildings of via Celoria, 26 and via Golgi;
- in the “Leonardo” Campus of the Politecnico di Milano, Piazza Leonardo da Vinci 32.

Biblioteche

The main campus library is the “Biblioteca di biologia, informatica, chimica e fisica” (Via Celoria 18). Link: http://www.sba.unimi.it/en/libraries/13453.html

Note

Students with a Bachelor degree (Laurea Triennale) in Information Engineering who obtained the BCG Master degree will also have the opportunity of enrolling in the Master degree program in 'Computer Science and Engineering' of Politecnico di Milano, with the automatic transfer in their career of part of the CFUs acquired in the BCG program; thus, they will have a very significant reduction of the number of exams to be taken to obtain the second degree in 'Computer Science and Engineering'. Students interested in this opportunity can contact Prof. Marco Masseroli (marco.masseroli@polimi.it) for further information.

Tutorato

Tutors will provide students with academic advice, guidance on their course choices and personal advice. Students can contact, according to their needs, tutors from both University of Milan and Politecnico di Milano.
They can be reached at their institutional e-mail addresses (name.surname@unimi.it for the University of Milano teachers or name.surname@polimi.it for Politecnico di Milano teachers).

Attività obbligatorie

All training activities mentioned in "Program structure" are considered mandatory for the Master degree.

Obbligo di frequenza

Course attendance is highly recommended. Exceptions for students planning not to attend all or most of the classes of a course (“studenti non frequentanti”) must be motivated and authorized by the lecturer.

Modalità di valutazione del profitto

Each course is followed by an exam, usually in the form of a written or oral test (or a combination of the two). Exam grades are calculated on a 30-point scale, 18/30 is the minimum passing grade. Credits for a course are only granted upon passing the corresponding exam. Courses can be taught by more than one instructor: in this case, only one lecturer will be responsible for the final assessment of the student.

Regole generali per iscrizione e ammissione agli appelli d'esame

Exam sessions are scheduled during recess at the end of each semester. For each course, a minimum of 5 tests are scheduled per academic year. Although in principle there is no limit in the number of tests that the student can take per year, some limitations can occur for exams not managed within the BCG Master degree.

Exam registration is compulsory and must be carried out through the UNIMIA - exams registration online service (available at https://bcg.cdl.unimi.it/en/study/exams) in order to allow CFUs to be automatically accredited to the student’s personal record.

Formulazione e presentazione piano di studi

The students will submit a “Study plan”, with the indication of elective courses they intend to attend and how they want to utilize the 12 CFU of freely chosen activities, before the beginning of the classes of the second year (from September 1st to September 15th). The Study plan must be approved by a Study Plan Committee, composed of BCG lecturers. The Study plan can be changed upon request; however, it represents the official record of the degree, and the list of courses must correspond to the exams passed by the student in order to grant admission to the final dissertation.

Information about dates and procedures for submitting the official study plan: https://www.unimi.it/en/study/bachelor-and-master-study/following-your-programme-study/plan-study.

Caratteristiche Tirocinio

The students will carry out an internship consisting of an original research experimental project leading to the writing of a dissertation in English, whose discussion will constitute the final graduation exam. The internship involves the attendance of a research laboratory at University of Milan, or the Politecnico di Milano, or in other research institutions, upon preliminary authorization of the Coordinator of the Master degree. The internship and the preparation of the dissertation account for a minimum of 21 CFU, that if needed can be extended by choosing to employ further 6 CFU from freely chosen activities. The dissertation will describe the research project carried out by the student under the supervision of a researcher or lecturer of either the University of Milan or the Politecnico di Milano, and its subject must be consistent with the goals and the disciplines taught in the Master degree.

Caratteristiche della prova finale

The final exam consists of the oral presentation and discussion of the research project main results in front of a dissertation committee and it contributes with a maximum of 10 points to the final grade. The final grade will be thus assigned as the

weighted average of the grades in the lecture courses, calculated on a scale of 110, to which the points of the final dissertation will be added.

Orario lezioni

Lessons of the first term (semester) will take place between September 15th 2025 and January 16th 2026. Lessons of the second term (semester) will take place between February 16th 2026 and June 12th 2026.

Lesson timetables are available at the URL: https://easystaff.divsi.unimi.it/PortaleStudenti/ or by downloading the official student Class timetable app of the University of Milan “Lezioniunimi”.

ESPERIENZA DI STUDIO ALL'ESTERO NELL'AMBITO DEL PERCORSO FORMATIVO

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.

Cosa offre il corso di studi

The BCG degree program supports the international mobility of the University program: a lecturer (for the academic year 2024/2025, Prof. Matteo Chiara) acts as a tutor for students interested in the Erasmus+ program, in order to guide students in their choice of the most suitable program for their formation.

In the framework of the Erasmus+ program, the BCG Master course has in place agreements with Universities in Denmark, Germany, Spain, France, Norway, and The Netherlands, all offering courses in English.
Calls for participation can be found at the following link: https://www.unimi.it/en/international/study-abroad/studying-abroad-erasmus

The time spent abroad can be used to attend courses and pass the relative exams, thus collecting credits towards the Master degree, as well as to carry out the experimental project for the dissertation. The student admitted to the mobility program must submit a study plan detailing the training activities that he/she plans to carry out, with the corresponding credits. The number of credits should correspond as much as possible to the number of credits that the student should acquire in a similar time at the home University. The proposed activities must be consistent with the goals and the contents of the Master degree. The study plan must be approved by the BCG Student Mobility Committee, which can request changes or integrations. At the end of the mobility program, according to the guidelines provided by the University of Milan, the courses attended (with a passed exam) by the student are registered in his/her career, preferably with its original name and with an indication of the ECTS (European Credit Transfer and Accumulation System) and their conversion in CFU (usually 1 ECTS = 1 CFU). The students willing to carry out their dissertation work as part of a mobility program abroad must have an internal supervisor (chosen among the BCG lecturers) and the study plan must be approved by the BCG Teaching Board.

Modalità di partecipazione ai programmi di mobilità - mobilità Erasmus

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

MODALITA' DI ACCESSO: 1° ANNO PROGRAMMATO

N° posti riservati a studenti extracomunitari non soggiornanti in Italia
10

N° posti assegnati
50

1° ANNO DI CORSO (disattivato dall'a.a.2025/26)Attività formative obbligatorie

Erogazione	Attività formativa	Modulo/Unità didattica	Cfu	Settore
	Bioinformatics and Computational Biology		6	ING-INF/05
	Organic Chemistry		6	CHIM/06
	Biostatistics		6	(5) SECS-S/01, (1) MAT/06
	Genomics and Transcriptomics		12	BIO/11
	Machine Learning		6	(5) ING-INF/05, (1) INF/01
	Scientific Programming		6	ING-INF/05
		Totale CFU obbligatori	42	

Attività a scelta

Students with a degree/background in computer science, engineering, mathematics or physics will attend the courses of the "Knowledge Alignment Plan 1".
Students with a degree/background in life sciences (biology or biotechnology or equivalent) will attend the courses of the "Knowledge Alignment Plan 2".

	Biochemistry *(Knowledge Alignment Plan 1)*		6	BIO/10
	Genetics, Cellular and Molecular Biology *(Knowledge Alignment Plan 1)*		12	(5) BIO/11, (5) BIO/18, (2) BIO/13
	Programming and Data Bases *(Knowledge Alignment Plan 2)*		12	(10) ING-INF/05, (2) INF/01
	Statistics *(Knowledge Alignment Plan 2)*		6	(5) SECS-S/01, (1) MAT/06

2° ANNO DI CORSO Attività formative obbligatorie

Erogazione	Attività formativa	Modulo/Unità didattica	Cfu	Settore
1 semestre	Advanced Genomics and Epigenomics		12	(6) BIO/19, (6) BIO/18
1 semestre	Structural Chemistry		6	(4) ING-IND/34, (2) CHIM/06
1 semestre	Systems Biology and Network Analysis		6	ING-INF/06
		Totale CFU obbligatori	24	

Attività a scelta

Open choice courses: 12 CFU
The student can employ part of all of the 12 CFU of freely chosen activities in attending one ore more of the following courses:

1 semestre	Genomic Big Data Management and Computing		6	(1) BIO/11, (5) ING-INF/05
1 semestre	Interdisciplinary Project		6	(1) BIO/11, (5) ING-INF/05
1 semestre	Neurogenomics and Brain Disease Modelling		6	BIO/11

Attività conclusive

	Final dissertation		21	NN
annuale	Language Skills and other activities (attendance to seminars, etc.)		3	NN
		Totale CFU obbligatori	24	

PROPEDEUTICITA'

There are no propaedeutic courses in the BCG degree that can limit progression from the first to the second year.

RICONOSCIMENTI E VECCHI ORDINAMENTI

Riconoscimenti crediti già acquisiti

CFU PREVIOUSLY ACQUIRED IN OTHER MASTER DEGREES

Students that previously acquired CFU in another Master program will undergo the audit of an ad hoc committee that will decide if and how many of the CFU can be validated upon admittance to BCG.

CFU ACQUIRED DURING PROFESSIONAL EXPERIENCES

A maximum of 12 CFU can be acquired (according to art. 5, comma 7, del DM 270/2004) by certified professional experiences and by post-secondary level educational activities performed in association with the University.