UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2020/21
MASTER DEGREE IN
BIOTECHNOLOGY FOR THE BIOECONOMY - (Classe LM-7)
Immatricolati dall'anno accademico 2018/19

HEADING

Degree classification - Denomination and code:	LM-7 Agricultural biotechnologies
Degree title:	Dottore Magistrale
Length of course:	2 years
Credits required for admission:	180
Total number of credits required to complete programme:	120
Course years currently available:	1st , 2nd
Access procedures:	open, subject to entry requirements
Course code:	G64

PERSONS/ROLES

Head of Study Programme

Prof.ssa Sara Borin

Tutors - Faculty

- Academic guidance tutor
Alessio Scarafoni, Fabio Forlani, Sara Borin
- Erasmus and international mobility tutor
Alessio Scarafoni
- Study plan tutor
A-M Fabio Forlani
N-Z Alessio Scarafoni
- Seminar and workshop tutor
Fabio Forlani
- University and programme transfer tutor
Sara Borin
- Master's degree admission tutor
Sara Borin
- Credit recognition tutor
Sara Borin

Degree Course website

https://biotechnologybioeconomy.cdl.unimi.it/en

Didactic Secretariat of the Faculty of Agricultural and Food Sciences

via Celoria 2 - Milano Città Studi Opening hours: monday to friday from 10 a.m. to 12 a.m. Email: didattica.agraria@unimi.it

Head of study programme

Tel. 0250319118 Email: presidenza-BforB@unimi.it

Students administrative office

via Celoria 18 - Milano Città Studi Tel. 0250325032 https://www.unimi.it/en/study/student-services/welcome-desk-informastudenti/student-desks-locations-and-opening-hours https://www.unimi.it/en/study/student-services/welcome-desk-informastudenti

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

Bioeconomy responds to the environmental challenges the world is facing, oriented to reduce the dependence on natural resources, transform manufacturing, promote sustainable production of renewable plant, microbial and animal resources and their conversion into food, feed, materials, bio-based products and bio-energy, while growing new jobs and industries. Biotechnology is one of the key enabling technologies to sustain a new green and sustainable economy (i.e. bioeconomy), offering solutions for i) an efficient and sustainable production of plant and microbial biomasses; ii) production of bioenergy

from (waste) biomasses; environmental protection and safety in terms of bioremediation; iii) green chemistry processes and applications; iv) sustainable agri-food production and processes, v) circular economy.
In this context, the BforB Master degree aims at providing students with advanced molecular and cellular background of microbial and plant systems, which are the basis for the several sectors of the biotechnologies applied to the bioeconomy. The BforB Master degree will equip students with a solid and broad expertise about the structure and function of biological macromolecules of interest for the bioeconomy sector. In addition, the BforB Master degree will provide theoretical and practical instruments for the set-up, analyses and improvement of biotechnological processes for the transformation of renewable raw materials in biotechnological processes exploiting microorganisms, plants and enzymes.
The BforB Master degree will be taught entirely in English, providing the students with knowledge and competences that can be spent at European and extra European level, to which the bioeconomy sector is faced. Moreover, the English language will allow the participation of students from out of Italy, making the Master degree a stimulant international learning environment.

Expected learning outcomes

The students of the BforB Master degree will acquire advanced skills and competences in the:
- set-up and optimisation of the production efficiency of biological systems (microorganisms, plants, enzymes) involved in bioprocesses in the agriculture, food and environmental sectors, in relation with the consumer needs and the environmental sustainability;
- exploitation of the bioinformatics tools and genomics, proteomics and metabolomics databases;
- set up of molecular and chemical analyses methods for basic and applied research activity;
- scientific experimental planning and project design and management;
- basic knowledge in bioeconomy, business management, life cycle assessment and marketing of biotechnological products.
Soft skills enabling team working and the moving into the work market or the scientific research fields will complete the competencies of the BforB Master Degree students.

Professional profile and employment opportunities

The BforB graduate is an expert in coordination, management and set up of research and development laboratories in public entities and in private companies in the chemical, agro-environmental and biotechnological sectors.
The function will primarily be the development, implementation and coordination of laboratory activity within basic and applied research projects, the set-up of bioprocesses, the quality control.
More in detail, the BforB graduate is an expert in planning, development, analyses and control of processes for:
- industrial fermentation for production of metabolites and renewable energy;
- plant and microbial cell as biofactories for molecules of interest in the fine chemical and polymer industry, agro-food and pharmaceutical industry with particular application to the green chemistry and bio-based industry;
- bioremediation of contaminated land and waters, using plants and/or microorganisms;
- innovative diagnosis tools, applied in particular to the traceability in agro-food chain.
The employment opportunities for the BforB graduate are in research bodies (both public and private) and bio-based chemical, pharmaceutical, agro-food, and biotechnological enterprises.

Pre-requisites for admission

- Requirements for admission
Students with an Italian University degree: The BforB Master degree can be accessed by graduates of Laurea Triennale belonging to the L-2 class (Biotecnologia) and previous class 1 (Biotecnologia). It can also be accessed by any student with a Laurea Triennale providing a strong background (at least 60 University credits, CFU) in biotechnology-related subjects, i.e., subjects identified as “core disciplines” for the L-2 class of Laurea Triennale (SSD AGR/01-02-03-04-07-11-12-13-15-16-17-18-19-20; BIO/01-02-03-04-05-06-07-09-10-11-12-13-14-15-16-17-18-19; CHIM/01-02-03-04-05-06-08-09-10-11-12; ING-IND/25-26; IUS/01-02-04-14; MED/02-03-04-05-07-09-13-15-42; M-FIL/02-03; SECS-P/06-07; VET/01-02-03-04-05-06-07-08-10).
Students with a degree from a non-Italian institution: the candidates must possess a Bachelor’s degree from an accredited college or University comprising exams in the following areas: molecular biology, genetics, microbiology, plant cell biology, biochemistry, chemistry.
All students must have a good knowledge of spoken and written English as a mandatory prerequisite to enrolment, certified by one of the following:
• Bachelor degree obtained in an international English bachelor course (provide a certification at application for admission);
• B2 level certification (vantage or upper intermediate, as defined by the Common European Framework of reference for Languages: Learning, Teaching, Assessment; recognised certifications: https://www.unimi.it/sites/default/files/2019-05/certificazioni-lingua-inglese_Feb2019.pdf);
• A B2 result in the placement test given by the University of Milan on September 22, 2020. Students that will not provide a valid certification at the admission application will be contacted by the course secretariat on September 18, 2020 to sustain the English placement test. Who will not attend the test will not have any other possibility to obtain the English certification by the University of Milan and will mandatorily need to obtain a certification from an external accredited institution within December 2020, 31st.

- Eligibility assessment.
The personal curriculum of the applicants and the certifications will be evaluated by an Admission Committee composed of the coordinator and at least two lecturers of the Master degree. No interview is foreseen. The applicants will receive

communication of their eligibility and will be allowed to enrol in the Master degree program.

- Practical instructions
Applicants considered eligible by the Admission Committee can enrol in the BforB Master degree under the terms and conditions indicated at https://www.unimi.it/en/education/biotechnology-bioeconomy.
Students who have applied for admission to BforB prior to the conclusion of their bachelor degree (Laurea Triennale) and/or did not present a valid certificate for the knowledge of the English language (B2 level) or did not pass the Placement Test, if possessing the other admission requirements, will be granted the possibility to attend the first term classes. In this case students must present to Segreteria Studenti the bachelor degree and/or the English certification up to December 31st 2020 to receive formal admission to the course. Only after admission students are allowed to enrol and only after enrolment they are allowed to give exams.

Programme structure

- Introduction
This “Manifesto degli Studi” represents the syllabus for the Biotechnology for the Bioeconomy (BforB) Master degree at the University of Milan (Italian: Laurea Magistrale nella classe LM-7 “Biotecnologie Agrarie”). The Department of Food, Environmental and Nutritional Sciences and the associated Department of Agricultural and Environmental Sciences are the academic institutions responsible for the BforB Master degree.

- Programme structure
The BforB Master degree is a 2-year course, and each year is divided in two terms. The program includes different activities: frontal lessons, practical classes, field visits and a final experimental project leading to the final public dissertation.

120 educational credits (CFU, crediti formativi) are required to complete the Master Degree. One CFU corresponds to a standard student workload of 25 hours and is calculated as follows:
Frontal lectures: 8 hours of lecture and 17 hours of personal elaboration
Practical classes: 16 hours of laboratory activity and 9 hour of personal elaboration
Experimental project: 25 hours of laboratory and/or training activity

The student must acquire:
61 CFU
9 mandatory courses (see table 1 below)
12 CFU
2 courses chosen from a list of 5 elective courses (see table 2 below)
8 CFU
1 or more courses freely chosen among i) the optional courses specifically activated by the BforB Master Degree (see table 3 below), ii) among elective course (see table 2 below), or iii) among all courses activated by the University of Milan for Master Degrees as long as consistent with the aims of the BforB degree and not a repetition of a course already offered by the degree program.
It is possible to exceed the amount of 8 CFU. Students that already acquired 8 CFU with free choice courses are allowed to follow additional courses but these will not be computed in the final degree score.
A maximum amount of 4 CFU can be acquired by interdisciplinary laboratory activities organised within other Master Degree courses (e.g. REE laboratories) or specifically agreed with one of the Master Degree teachers. Laboratory activities will be certified by Prof. Fabio Forlani on behalf of the BforB Study Plan Committee.
3 CFU
other certified activities (participation to seminars, workshops, external courses). The 3 CFU can also be acquired within the final laboratory internship, by extending the research activities with a small side project. The activities will be evaluated and certified by Prof. Fabio Forlani on behalf of the BforB Study Plan Committee.
36 CFU
individual experimental project thesis leading to the final dissertation, to be started in the second year.

Elective and optional courses can be followed during the first or the second year of the Master Degree program, as a student choice. The suggestion is to follow during the second semester of the first year most of the courses, in order to leave the second semester of the second year free for the experimental thesis or stage abroad.

- Core/compulsory activities
All training activities mentioned in “program structure” are considered mandatory for the Master degree. Lesson attendance is strongly suggested, exceptions must be motivated to the lecturer. All students must start lesson attendance in the fall semester of the first year: this Master Degree does not have a spring edition.

- Testing and assessment procedures
Each course is followed by an exam, usually a written or an oral test (or a combination); students are graded on a maximum score of 30, with 18/30 being the minimum pass grade. Credits for a course are only granted upon passing the corresponding exam. More than one instructor can teach courses: in this case, only one lecturer will be responsible for the final assessment of the student.

- Procedures for exam registration and admittance

Exam sessions are scheduled during recess at the end of each term and during the one-week lesson break in the middle of each term. For each course, at least 6 tests are scheduled per academic year.

- Lecture timetable

The first term will take place between September 2020 and January 2021.
The second term will take place between February 2021 and June 2021.
Lesson timetables and course syllabus will be available at the URL: https://www.unimi.it/en/study/bachelor-and-master-study/following-your-programme-study/course-timetables.

- Study plan definition and submission for approval.

The students will submit a "Study plan", with the indication of elective courses they intend to attend, and how they want to utilize the 11 CFU of freely chosen activities, at the beginning of the second term of the first year (deadlines will be published at www.unimi.it). The Study plan must be discussed with the tutors and then approved by a Study Plan Committee, composed by BforB 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.

Campus

Lecture rooms and laboratories are located in the "Città Studi" campus, mostly in the Food and Agriculture Faculty, Via Celoria 2 (https://www.unimi.it/en/education/faculties-and-schools/agricultural-and-food-sciences).

Libraries

In the faculty are located study room and library. A main campus scientific library is located in Via Celoria 26 (Biblioteca Biologica Interdipartimentale).

Tutoring

Tutors will provide students with academic advice, guidance for course choice and personal advice. Students can contact the tutors at their standard institutional email addresses (name.surname@unimi.it).

Internship criteria

The students will carry out an experimental project leading to writing a dissertation in English, whose public discussion will constitute the final exam. The experimental project involves the attendance of a research laboratory either at University of Milan or in other research laboratory, upon previous authorization of the Coordinator of the Master degree. The experimental project accounts for 36 CFU, and thus it represents a main activity within the Master degree program. The dissertation will describe an original research carried out by the student under the supervision of a lecturer within the BforB Master degree, and its subject must be consistent with the goals and the disciplines taught in the Master degree.

Degree programme final exam

The final exam consists of the oral presentation and discussion of the thesis 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.

EXPERIENCE OF STUDY ABROAD AS PART OF THE DEGREE 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 30 different 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

In the framework of the ERASMUS+ program, the BforB Master course has in place agreements with Universities in, Finland, Germany, Spain, France, Austria, 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 span of 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 BforB 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 (with a passed exam) and laboratory trainings attended by the student are registered in his/her career, 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 BforB lecturers) and the study plan must be approved by the BforB board.
For carrying out any experimental activity abroad, a letter of acceptance from the hosting supervisor is required. If the experimental activities are intended to be part or all the dissertation work (thesis), a similar letter should be drawn up by the internal supervisor. These letters must be sent to the ERASMUS Coordinator before the departure to the foreign destination. As a general rule, if the period of stay at the foreign laboratory is less than seven months long, the student should complete the thesis work at the laboratory of the internal supervisor, or other laboratory indicated by the supervisor himself, in order to complete the training process.

How to participate in Erasmus mobility programs

The students of the University of Milan can participate in mobility programmes, which last 3 to 12 months, through a public selection procedure.
Ad hoc commissions will evaluate:
• 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 generally begins around February each year with the publication of a call for applications specifying the destinations, with the respective programme duration, requirements and online application deadline.

Every year, before the deadline for the call, the University organizes informative meetings to illustrate opportunities and rules for participation to students.

Erasmus+ scholarship
The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which is 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.

Learn more at https://www.unimi.it/en/international/study-abroad/studying-abroad-erasmus.

For assistance, please contact:
International Mobility Office
Via Santa Sofia 9 (second floor)
Tel. 02 503 13501-12589-13495-13502
E-mail: mobility.out@unimi.it
Desk opening hours: Monday to Friday 9 am - 12 noon

ADMISSION CRITERIA: 1ST YEAR OPEN, SUBJECT TO ENTRY REQUIREMENTS

Application and enrolment information and procedures

https://www.unimi.it/en/study/enrolment

N° of places reserved to non-EU students resident abroad

15

1st COURSE YEAR Core/compulsory courses/activities

Scheduling	Learning activity	Module/teaching unit	Ects	Sector
1	Biomass and waste recycling promoting the circular economy		7	AGR/13
1	Fermentation biotechnology (Total number of ects:7)	Industrial Bioprocesses Development	4	CHIM/11
		Improvement of bioprocesses in yeast	3	CHIM/11
1	Methods in biotechnology (Total number of ects:10)	Genomics	3	(3) AGR/07, (3) AGR/11, (3) AGR/12
		Functional genomics	4	(4) AGR/07, (4) AGR/11, (4) AGR/12
		Molecular taxonomy	3	(3) AGR/07, (3) AGR/11, (3) AGR/12
1	Structure and functions of biomolecules (Total number of ects:7)	Structure and function of biomolecules	4	(4) CHIM/06, (4) CHIM/10

		Biomolecular spettroscopy	3	(3) CHIM/06, (3) CHIM/10
2	Environmental microbial biotechnology		6	AGR/16
2	Environmental plant biotechnology		6	AGR/13
2	Plant as biofactories		6	AGR/07
2	Protein engineering and proteomics		6	BIO/10
		Total number of compulsory credits/ects	55	

2nd COURSE YEAR Core/compulsory courses/activities

Scheduling	Learning activity	Module/teaching unit	Ects	Sector
	Internship and final exam		36	NA
1	Bioeconomy: management, assessment and intellectual property (Total number of ects:6)	Intellectual property	2	AGR/01
		Life cycle assessment	2	AGR/01
		Management	2	AGR/01
		Total number of compulsory credits/ects	42	

Elective courses

Table 2 - Elective courses: the student will chose 2 course among the list of elective courses. The list does not include "Natural resource economics and policy", not activated in 2020-21 academic year. Chose 2 among the following:

1	Bio-based innovation in food industry (Total number of ects:6)	Closed-loop food supply chains	1.5	AGR/15
		Innovative Food Processing and Products	1.5	AGR/15
		Bio-based food packaging	1.5	AGR/15
		Sensory and Consumer science	1.5	AGR/15
1	Experimental planning and biostatistics in biotechnology		6	(6) BIO/10, (6) AGR/17
1	Molecular analysis and traceability of biotechnological products		6	BIO/10
2	Applied biocatalysis		6	CHIM/11
2	Functional foods and nutraceuticals		6	BIO/09

UNDEFINED COURSE YEAR - COMPULSORY COURSES/ACTIVITIES

Scheduling	Learning activity	Module/teaching unit	Ects	Sector
	Other activities (laboratories, seminars)		3	NA
		Total number of compulsory credits/ects	3	

Further elective courses

Table 3 - Optional courses specifically planned by the BforB Master Degree

1	Microbiology and Biotechnology of Extremophiles: case studies to develop soft skills in science		4	AGR/16
1	Molecular plant pathology		4	AGR/12
2	Biomolecular experiment planning		2	BIO/10