

Faculty: Science and Technology
Interclass first level degree in Biosciences and Biotechnology
Class: L-2 Biotechnology, L-13 Biology

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1. Introduction

The main objective of the course leading to the interclass degree in Biosciences and Biotechnology for first level students in class L2 (Biotechnology) and L13 (Biological Sciences) is to provide a broad and sound cultural background in the life sciences and their applications in biotechnology.

The establishment of a first level degree course in Biosciences and Biotechnology stems from the need to train a professional figure who can combine the broad and deep knowledge of basic and advanced principles of biology with biotechnology skills to successfully integrate into biotech companies, pharmaceutical companies and basic research labs within a broad dynamic and international working context.

In this connection, all the courses will be presented in English; in this way the students will be able to develop and master English language skills in a manner superior to that possible in regular language classes so that international access and mobility for the students and graduates would be facilitated.

In addition to the required technical and conceptual scientific courses, the degree programs also includes modules relevant to socio-economic, juridical and informatics aspects which are likewise essential in the international working context.

The interclass degree in Biosciences and Biotechnology consists of a common first year, where the student is provided with a solid base in mathematics, physics, chemistry and biology, followed by a second and third year when the student follows either the program leading to the Biology or Biotechnology degree.

Upon enrolment in the interclass degree, students must indicate the qualification desired (Biology or Biotechnology); however, the final decision between the two program degrees can be delayed to the third year, provided that the missing credits are fully covered.

To ensure a highly flexible and personalized curriculum, the interclass degree in Biosciences and Biotechnology includes 12 credit units for elective courses. Furthermore, 15 credit units will be devoted to practical laboratory courses, "stage" internship and/or additional professional training.

In summary, the major educational objective of this interclass degree is to give students a solid biological background and multidisciplinary technical expertise as well as the proficiency in English, suitable for a career in international biotech industries and research labs.

Most of the credits obtained with this first level degree are prerequisites for enrolment in the

Second level degrees related to Biology and Biotechnology.

2. Qualifying Educational Objectives

Graduates with the Biosciences and Biotechnology degree of the University of Camerino are able to:

- critically comprehend the basic concepts of the various sectors of biology and apply the scientific method of inquiry to specific problems;
- utilize the knowledge and skills acquired in specific fields, such as classification of living organisms and problems of transmission and expression of hereditary characters at the cellular, individual and population levels;
- apply the knowledge and skills acquired to provide technical and professional support to productive and technological activities, laboratories and services, at analysis, inspection, and management levels;
- adapt the knowledge and skills acquired to specific problems such as environmental reclamation;
- communicate and exchange information concerning biological and biotechnological concepts and problems with specialists in biology as well as the general public
- to be proficient in English within one's specific sphere of activity as well as for exchange of general information;
- draw upon the skills acquired in the degree program to pursue with autonomy further training and/or carry out specialized activities at the workplace.

To achieve the objectives indicated above, the Biology degree program includes formative activities that should enable the student to:

- acquire the fundamentals of mathematics, statistics, computer science, physics, and chemistry;
- acquire the fundamental knowledge, both theoretical and practical, of the biology of microorganisms, plants, animals extending up to humans, and the mechanisms of heredity and development, at morphological, functional, cellular and molecular levels; to learn the effects that the presence of these organisms may have upon the environment;
- develop practical skills through various laboratory courses;

- study outside the university as an apprentice in a related industry, a public institution or a laboratory in Italy or abroad, in the context of international agreements.

3. Employment areas for graduates and career opportunities

Graduates with the Biosciences and Biotechnology degree of the University of Camerino are able to:

- apply standard protocols and well-established know how related to the life sciences to active service and production;
- perform quality control tests of industrial products having biological and biotechnological interest;
- use experimental procedures and analytical techniques to perform biochemical, microbiological, virological, pharmacological, hematological, immunological, cytological and histopathological tests and analyses in the biomedical field.

Graduates with the Biosciences and Biotechnology degree have the opportunity to gain positions in:

- fields which require familiarity with the scientific method as well as skill in utilizing innovative methodologies based on biological systems;
- research laboratories or industries which utilize cellular biology, genetic and biomolecular techniques.

Graduates of the degree programs in Biological Sciences and Biotechnology are qualified to gain positions in:

- regional agencies (ARPA) and the National Agency (APAT);
- regional national and parks;
- national institutions which operate locally (CNR, ENEA, etc.);
- public and private agencies and laboratories of analysis;

where they are able to operate with competence to analyze and evaluate the quality of the natural and anthropized environment with duties of oversight, prevention, and restoration;

- in the field of research;
- in the field of scientific education and diffusion.

The Interclass L2/L13 Degree in Biosciences and Biotechnology affords admission to the state boards for membership in Section B of the Biologist's Professional Register.

4. Exemption from fees

Students enrolling for the first time in the Degree in Biosciences and Biotechnology are completely exempt from paying the first instalment of tuition fees. To maintain the exemption at the time of payment of the second instalment, the student must have successfully completed at least one exam with a grade of at least 25/30. To maintain the exemption for the second year (November 5), the student must have successfully completed at least 50% of the credits provided by the plan of study with a grade of at least 25/30. Finally, to maintain the exemption for the third year (November 5), the student must have successfully completed at least 65% of the credits provided by the plan of study with an average grade of at least 25/30. Those students who, based on family income, are in the 4th band (income statement certified by ISEE exceeding 32000 Euros annually) are excluded from this exemption.

5. Teaching organization

5.1 European Credit Transfer and Accumulation System (ECTS)

To earn the degree in Biosciences and Biotechnology, the student must gain 180 credits, with 60 credits representing the average study workload in one academic year for a full-time student having a suitable starting preparation. According to the European Credit Transfer and Accumulation System (ECTS) one credit is equal to 25 working hours which could include lectures, practical laboratory courses and individual study required to reach the learning outcome. The ratio between the time spent for tutored activities and the time spent for individual studies should usually be about 1:3. One ECTS usually corresponds to a 8-hour frontal lecture or a 12-hour practical session. Therefore, 6 ECTS could be gained from a 48-hour frontal lecture course or a 72-hour laboratory course/module. Note that these figures may vary according to the type of course. Moreover a credit should correspond to a 25-hour workload for a student preparing the final exam and the internship (stage). ECTS of training activities selected from other degree courses will be calculated according to university's degree course handbook.

5.2 Assessment

All activities concerning ECTS must be assessed. The assessment is expressed by specific committees chaired by the staff in charge of the training activities. Courses can be either individual or integrated with a corresponding laboratory module. In case of complementary courses there will be one single exam. Course examinations are usually carried out in written and/or oral form. In case of integrated courses specific tests may be required in addition to the written and oral examination. Unless otherwise indicated, training activities are assessed by a grade expressed in 30^{ths} with the possibility of the additional recognition of "lode" (with honors). To gain credits for internships a report on the performed activities countersigned by the teacher is required. In this case the assessment would be either pass (idoneo) or fail (non idoneo).

5.3 Lecture and exam calendar

Teaching activities will start on 5th October 2009, with the exception of the pre-courses for new undergraduate students, which will start on 1st October 2009. They are divided into 2 semesters according to the following calendar:

| | | | |
|-------------------------------|--|----|--------------------------------|
| I Semester Teaching Activity | 1 st October 2009 (1 st Year) 5 th October 2009 (2 nd and 3 rd Year) | to | 29 th January 2010 |
| I Exam session | 1 st February 2010 | to | 26 th February 2010 |
| II Semester Teaching activity | 1 st March 2010 | to | 11 th June 2010 |
| II Exam Session | 14 th June 2010 | to | 30 th July 2010 |
| III Exam Session | 31 st August 2010 | to | 1 st October 2010 |

Course information related to time and place of lectures is available on-line at:
<http://www.unicam.it/studenti>.

The calendar of exam sessions for each course is available at:

<https://didattica.unicam.it>

Students who wants to take an exam must register on-line
(<https://didattica.unicam.it>).

The exam program is the last teaching program carried out for the same course. Therefore the program carried out during the course will generally be valid for 12 months from the end of teaching activities.

6. Final exam

The final exam (esame di laurea) consists in a public discussion of a written (in English) report describing the internship experience, with the goal of evaluating both the overall preparation of the student and the quality of the work carried out

during the internship period. The report must be prepared under the guidance of a professor appointed by the Chairman. The student is admitted to the final examination only upon completion of 180 CFU.

The final grade, expressed in 110th with the possibility of the additional recognition of "lode" (with honors), evaluates the student's curriculum and his scientific preparation achieved at the end of his course of study. The exam will be taken in front of a special Committee constituted in accordance with the University rules.

To determine the final grade, the Committee first evaluates both public presentation and written report, assigning a grade out of 30. Then the Committee determines the final grade using the following procedure:

- the weighted average of all the grades obtained in the various courses, including the grade just obtained for the final report, and training activities carried out during the three-year degree, is calculated using the Credit Units as the weighting factor;
 - the weighted average is transformed into a percentage
 - this percentage is multiplied by a coefficient associated with the duration of the student's academic career (three years: 1.09; four years: 1.07; five or more years: 1.05);
 - to this is added the product of 0.05 times the number of credits attained "con lode";
 - the result of this calculation is represented as an integer percentage, by adding 0.5 and then retaining only the integer part;
- the committee is allowed to add up to 2 units to the calculated grade, in the case of special activities in the student's curriculum.
- if the calculated grade is equal to or greater than 111, the committee may confer the label "lode" with a unanimous vote.

7. Tutoring, vocational guidance and internship

The Class Advisory Board will assign to each student a tutor to provide individual guidance throughout the student's university career. During the course of each semester, the tutoring coordinator will organize regular group meetings to discuss problems which may arise in any of the training activities. Students are encouraged to contact instructors by e-mail to request additional explanations on topics covered in class. Furthermore, the Class Advisory Board will provide vocational guidance to students in the third and final year of the program.

The internship scheduled for the III year, after the acquisition of 120 CFU, should be performed in an industrial, hospital or research institution laboratory, chosen with the assistance of the Stage and Placement office. A written report describing the internship experience must be presented at the end of the stage.

8. Mobility and Internalization

The University of Camerino has underwritten agreements with foreign Universities and Institutions making possible for staff, researchers and students to participate to exchange programs, such as Erasmus and Erasmus placement. Information related to the internationalization is available on-line at: http://web.unicam.it/international/mobility/mob_rel_int_eng.asp Further information can be obtained from the representative to the Internationalization.

9. Degree programs and curricula

The “first level” interclass degree in Biosciences and Biotechnology offers two degree programs:

- Biology (Degree class L-13)
- Biotechnology (Degree class L-2)

9.1 Biology (L-13)

In addition to basic elements of mathematics, statistics, informatics, physics and chemistry, the degree program in Biology provides an extensive and modern coverage of the life sciences, from the morphological, functional, biochemical, molecular, genetic, environmental and cellular points of view. Furthermore, the degree program is aimed at teaching the methodological and technical know-how necessary in basic biological research as well as in monitoring and quality control laboratories. In addition, the scientific-technical training program will be integrated with topics related to economics and law and training in communication skills.

The degree program in Biology is divided in core courses (134 CFU) and elective courses (12 CFU). The remaining credits are devoted to: courses aimed at increasing proficiency in English (6 CFU), practical laboratory courses (15 CFU), the internship (“stage”) (7 CFU) and the final exam (3 CFU).

Possible elective courses, propaedeutic for the admission to the second level degree (Laurea Magistrale) are listed below.

Note that a student may submit for approval by the Class Advisory Board individual curriculum for the following academic year, proposing learning goals other than those proposed in the standard curriculum. The deadline for the presentation of the individual curricula is the 15th of October of the academic year to which the curriculum refers.

The organization of the standard curriculum with the list of the disciplines and subjects, the division into modules, and the number of credits awarded is presented in the table below.

Year I

| N | Course | CFU | Module | CFU per SSD | Typology (a,b,c,d,e,f,s) | Numerical Grade or pass/fail |
|----------|----------------------------------|------------|---------------|--------------------|---------------------------------|-------------------------------------|
| 1 | General Biology and Microbiology | 9 | mod 1 | 4 BIO/06 | a | grade |
| | | | mod 2 | 5 BIO/19 | | |
| 2 | General and Inorganic Chemistry | 8 | | CHIM/03 | a | grade |
| 3 | Mathematics and statistics | 10 | | 10 MAT/07 | a | grade |
| 4 | Computer Science | 5 | | 5 INF/01 | a | grade |
| 5 | Organic Chemistry | 8 | | CHIM/06 | a | grade |
| 6 | Physics | 7 | | FIS/03 | a | grade |
| 7 | General genetics | 5 | | BIO/18 | a | grade |
| 8 | English | 6 | | L-LIN/12 | e | grade |
| 9 | Laboratory I | 6 | mod 1 | 3 CHIM/03 | b | pass/fail |
| | | | mod 2 | 3 CHIM/12 | c | |

Year II

| N | Course | CFU | Module | CFU per SSD | Typology (a,b,c,d,e,f,s) | Numerical Grade or pass/fail |
|----------|--|------------|----------------------|--------------------|---------------------------------|-------------------------------------|
| 10 | Molecular Biology and molecular genetics | 10 | mod1 | 5 BIO/11 | a | grade |
| | | | mod 2 | 5 BIO/18 | | |
| 11 | Biochemistry, Cell and developmental Biology | 15 | Biochemistry | 6 BIO/10 | b | grade |
| | | | Cell and dev.Biology | 9 BIO/06 | a | |
| 12 | Zoology | 7 | | BIO/05 | b | grade |
| 13 | Botany | 6 | mod 1 | 3 BIO/01 | b | grade |
| | | | mod 2 | 3 BIO/02 | | |
| 14 | Anatomy and histology | 10 | mod 1 | 5 BIO/16 | b | grade |
| | | | mod 2 | 5 BIO/17 | c | |
| 15 | Industrial economy | 4 | | SECS-P/07 | c | grade |
| 16 | Laboratory II | 9 | mod 1 | 3 BIO/10 (CHIM/03) | b | pass/fail |
| | | | mod 2 | 3 BIO/11 | | |
| | | | mod 3 | 3 BIO/18 | | |

Year III

| N | Course | CFU | Module | CFU per SSD | Typology (a,b,c,d,e,f,s) | Numerical Grade or pass/fail |
|----------|-------------------------------------|------------|---------------|--------------------|---------------------------------|-------------------------------------|
| 17 | Hygiene and Industrial Microbiology | 10 | mod 1 | 5 MED/42 | b | grade |
| | | | mod 2 | 5 BIO/19 | | |
| 18 | Ecology and Parasitology | 8 | mod 1 | 4 BIO/07 | c | grade |
| | | | mod 2 | 4 VET/06 | | |
| 19 | Physiology | 7 | | BIO/09 | b | grade |
| 20 | General and Clinical Diagnostics | 8 | mod 1 | 4 BIO/06 | b | grade |
| | | | mod 2 | 4 BIO/12 | | |
| 21 | Elective | 12 | | | d | grade |
| | Stage | 7 | | | f | |
| | Final test | 3 | | | e | |

- a) basic course
- b) core course
- c) supplementary course
- d) elective course
- e) for the final exam and for knowledge of a foreign language
- f) other (additional language skills, computer skills, internship/work experience stage etc.)

Elective courses

| Course | CFU |
|--|------------|
| Molecular enzymology | 4 |
| Structural biology of proteins | 4 |
| Biochemistry | 6 |
| Cell biology and cell biotechnology | 9 |
| Cell diagnostics and molecular applications | 10 |
| Food chemistry | 8 |
| Genetics of microorganisms and microbial biotechnology | 10 |
| Immunity and parasitology | 7 |
| Industrial and clinical microbiology | 10 |
| Law of bioethics and economy | 9 |
| Zoology | 7 |

9.2 Biotechnology (L-2)

In addition to basic elements of mathematics, statistics, informatics, physics and chemistry, the degree program in Biotechnology provides courses aimed at teaching structure and function of the biological systems as well as the theoretical and practical know-how necessary to produce modified biomolecules and/or cells useful in industrial transformation procedures.

The scientific-technical training program will be integrated with topics related to economics, law, bioethics, and training in communication skills and public relations.

The degree program in Biotechnology is divided in core courses (134 CFU) and elective courses (12 CFU). The remaining credits are devoted to: courses aimed at increasing proficiency in English (6 CFU), practical laboratory courses (15 CFU), the internship ("stage") (7 CFU) and the final exam (3 CFU).

Possible elective courses, propaedeutic for the admission to the second level degree (Laurea Magistrale) are listed below.

Note that a student may submit for approval by the Class Advisory Board individual curriculum for the following academic year, proposing learning goals other than those proposed in the standard curriculum. The deadline for the presentation of the individual curricula is the 15th of October of the academic year to which the curriculum refers.

The organization of the standard curriculum with the list of the disciplines and subjects, the division into modules, and the number of credits awarded is presented in the table below.

Year I

| N | Course | CFU | Module | CFU per SSD | Typology (a,b,c,d,e,f,s) | Numerical Grade or pass/fail |
|----------|----------------------------------|------------|---------------|--------------------|---------------------------------|-------------------------------------|
| 1 | General Biology and Microbiology | 9 | mod 1 | 4 BIO/06 | b | grade |
| | | | mod 2 | 5 BIO/19 | | |
| 2 | General and Inorganic Chemistry | 8 | | CHIM/03 | a | grade |
| 3 | Mathematics and statistics | 10 | | 10 MAT/07 | a | grade |
| 4 | Computer Science | 5 | | 5 INF/01 | a | grade |
| 5 | Organic Chemistry | 8 | | CHIM/06 | a | grade |
| 6 | Physics | 7 | | FIS/03 | a | grade |
| 7 | General genetics | 5 | | BIO/18 | a | grade |
| 8 | English | 6 | | L-LIN/12 | e | grade |
| 9 | Laboratory I | 6 | mod 1 | 3 CHIM/03 | b | pass/fail |
| | | | mod 2 | 3 CHIM/12 | c | |

Year II

| N | Course | CFU | Module | CFU per SSD | Typology (a,b,c,d,e,f,s) | Numerical Grade or pass/fail |
|----------|--|------------|---------------|--------------------|---------------------------------|-------------------------------------|
| 10 | Molecular Biology and molecular genetics | 10 | mod1 | 5 BIO/11 | b | grade |
| | | | mod 2 | 5 BIO/18 | | |
| 11 | Biochemistry | 6 | | BIO/10 | 3a and 3b | grade |
| 12 | Cell Biology and Cell Biotechnology | 9 | | BIO/06 | b | |
| 13 | Economy and law of Bioethics | 9 | mod 1 | 5 SECS-P/07 | c | grade |
| | | | mod 2 | 4 IUS/01 | b | grade |
| 14 | Immunity and Parasitology | 6 | mod 1 | 3 MED/04 | b | grade |
| | | | mod 2 | 3 VET/06 | b | |
| 15 | Food Chemistry | 8 | mod 1 | 4 CHIM/10 | b | grade |
| | | | mod 2 | 4 CHIM/08 | c | |
| 16 | Laboratory II | 9 | mod 1 | 5 BIO/17 | c | pass/fail |
| | | | mod 3 | 3 BIO/07 | | |

Year III

| N | Course | CFU | Module | CFU per SSD | Typology (a,b,c,d,e,f,s) | Numerical Grade or pass/fail |
|----------|--|------------|---------------|--------------------|---------------------------------|-------------------------------------|
| 17 | Genetics of Microorganisms and Microbial Biotechnology | 10 | | BIO/18 | b | grade |
| 18 | Industrial and Clinical Microbiology | 10 | | BIO/19 | a | grade |
| 19 | Clinical Diagnostics and Molecular Applications | 10 | Mod 1 | 5 BIO/12 | b | grade |
| | | | Mod 2 | 5 BIO/13 | | |
| 20 | Physiology | 7 | | BIO/09 | b | grade |
| 21 | Elective | 12 | | | d | grade |
| | Stage | 7 | | | f | |
| | Final test | 3 | | | e | |

- a) basic course
- b) core course
- c) supplementary course
- d) elective course
- e) for the final exam and for knowledge of a foreign language
- f) other (additional language skills, computer skills, internship/work experience stage etc.)

Elective courses

| Course | CFU |
|--|------------|
| Molecular enzymology | 4 |
| Structural Biology of proteins | 4 |
| Anatomy and Histology | 10 |
| Biochemistry, cell and developmental biology | 15 |
| Botany | 6 |
| Ecology and Parasitology | 8 |
| General and clinical diagnostics | 8 |
| Hygiene and industrial microbiology | 10 |
| Industrial economy | 4 |
| Zoology | 7 |

10. Entry Requirements

Admission to studies for the Degree in Biosciences and Biotechnology requires the upper-level middle school diploma or equivalent foreign qualification. All students who enrol in Biosciences and Biotechnology Degree must attend an interview aimed at orienting students to remedial courses that may be necessary to overcome any lack of academic preparation, in particular in mathematics (in the fields of Algebra, Geometry and Trigonometry), physics and chemistry. The remedial courses are planned before the beginning of the lessons of the first year. Since all the degree programs are in English, the students are expected to have at least a B1 (PET) level of English language ability, which will be evaluated through a test organized by the University of Cambridge. Students who do not meet our English language requirements, can bring their English up to the level needed by taking our English remedial courses.