UAB
Universitat Autònoma de Barcelona

Microbial Genomics

2026/2027

Code: 100983
Credits: 6

Degree programme	Type	Course
Microbiology	OP	4

Contact lecturer

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Teaching staff

Marc Bravo Bravo

Group languages

You can consult this information at the end of the document.

Prerequisites

It is recommended to have taken subjects related to Microbiology, Molecular Biology of Prokaryotes and Bioinformatics.

Objectives

The main objective of this course is to broaden the vision of microbial genomics and the molecular and bioinformatics techniques used as well as their current and future applications.

Learning outcomes

- CM11 (Propose strategies for molecular cloning, mutant generation and genetic improvement using omics analysis with ethical responsibility and gender perspective to provide innovative responses to the needs and demands of society.) Propose strategies for molecular cloning, mutant generation and genetic improvement using omics analysis with ethical responsibility and gender perspective to provide innovative responses to the needs and demands of society.
- CM12 (Integrate knowledge and skills of molecular biology and genomics to develop and present academic work in the field of microbiology, either in English or in one's own language or others and working individually and in groups.) Integrate knowledge and skills of molecular biology and genomics to develop and present academic work in the field of microbiology, either in English or in one's own language or others and working individually and in groups.
- KM18 (Identify the methods of study of nucleic acids for their sequencing, modification and interpretation of their expression products.) Identify the methods of study of nucleic acids for their sequencing, modification and interpretation of their expression products.
- SM15 (Use bibliography and databases related to molecular biology and genomics, both in English and in one's own language.) Use bibliography and databases related to molecular biology and genomics,

both in English and in one's own language.
- SM17 (Apply omics tools (genomics, transcriptomics, proteomics, metagenomics, etc.) to solve problems related to molecular biology and the study of populations and communities.) Apply omics tools (genomics, transcriptomics, proteomics, metagenomics, etc.) to solve problems related to molecular biology and the study of populations and communities.

Contents

The students will work on the following topics within the field of microbial genomics to address real-world problems and case studies, using computational tools and querying genomic databases:

- Methods for the study of genomics
- Genomic analysis
- Prokaryotic species concept and taxogenomics
- Structural genomics and evolution of genomes
- Comparative genomics. Core and accessory genome and pangenome
- Functional genomics: from genome to function
- Population genomics of microorganisms
- Genomic structure of microbial communities
- Pathogenomics and other omics
- Current challenges of microbial genomics

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Tutorship	3	0.12	CM11, CM12, KM18, SM17
Problem-Based Learning	37	1.48	CM11, CM12, KM18, SM15, SM17
Reading specialized texts	40	1.6	KM18, SM15
Search and management of information	20	0.8	KM18, SM15, SM17
Preparation of the work plans, reports and oral presentations	21	0.84	CM11, CM12, KM18, SM15, SM17
Integrate information and generate hypotheses	20	0.8	CM11, CM12
Lectures	3	0.12	CM11, CM12, KM18

This course will be taught mostly following the problem-based learning (PBL) method. The class group will be divided into small groups that will independently work up to three different problems indicated by the teacher. At the beginning of each problem there will be a participatory lecture to introduce key concepts. Each of the problems will last approximately 13 classroom sessions, including the evaluation tests.

The student's role will be to actively participate in the working group, to assign group moderator roles, spokesperson and activities coordinator to the group members. They should also work individually to research, select and manage the information to share, discuss and re-elaborate the new knowledge with their workgroup. Finally, the group will prepare reports, present and/or discuss with the rest of the class the knowledge acquired, its application in the context of the problem and in other contexts. The groups could also present scientific articles relevant to each problem as seminars.

The role of professors will be to facilitate the learning process, stimulate group discussions and critical thinking, provide the necessary tools for students to build knowledge and guide them. If necessary, some additional participatory master classes can be performed. As supervised activities and to support the learning activities indicated above, individual and collective mentoring will be possible. At the beginning of the course, teachers will explain to the students the organization of the subject and will give the working guidelines.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Teamwork self-assessment	5%	0.5	0.02	CM11, CM12
Assessment of delivery Problem 1	20%	0	0	CM11, CM12, KM18, SM15, SM17
Assessment of delivery and presentation Problem 3	20%	2	0.08	CM11, CM12, KM18, SM15, SM17
Problem 2 individual written exam	15%	1	0.04	CM11, CM12, KM18, SM15, SM17
Individual self-evaluation	5%	0.5	0.02	CM11, CM12
Assessment of delivery and presentation Problem 2	20%	1	0.04	CM11, CM12, KM18, SM15, SM17
Problem 1 Individual written exam	15%	1	0.04	CM11, CM12, KM18, SM15, SM17

The evaluation of the subject consists of three units associated with each of the proposed problems. The evaluation of each unit will be made according to the following distribution:

1. Exams associated with each problem. Consistent in a specific written test or oral presentation where the course-specific competencies, concepts and methodologies worked on each problem is assessed. Only for problems 1 and 2. Weigh 15% each.

2. Deliveries and/or reports associated with the problems. The report may consist of a written assignment and/or an oral presentation. The number and specific weight of each delivery, report, and/ or co-evaluation activity, as well as their format, will be indicated in the problem presentation session. Global weight 60%.

3. Self-assessment of individual and teamwork. Each member of the group should evaluate himself/herself and the functioning of the team in solving the problem. The maximum mark is 1.0 points out of 10 (10%).

Optional seminars and active and creative participation in class/forum may add up to 1 point on the final grade of the subject. In some cases, co-evaluations of other students' seminars will be carried out.

To pass each unit the student must obtain at least a score of 4.5 points out of 10 in the individual exams. If the student does not pass any of the individual written tests, he/she will perform a retake examination. To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two-thirds of the final score of the course or module.

To pass the subject, it is mandatory to attend a minimum of 20 classroom sessions, including attendance at the working sessions of the class group, whose date of celebration will be established during the course development. The absence without justification or non-profit of the classroom sessions may subtract up to 1 point from the final grade of the subject.

The students pass the course when the average mark of the evaluation activities is equal to or greater than 5.

The student will be graded as \"Non-evaluable\" if the weight of all conducted evaluation activities is less than 67% of t final score.

For those students who choose the single assessment system, this assessment will consist of a single written test in which the contents of the entire program of the subject will be evaluated. The test will consist of multiple choice questions, other types of short questions and topics to be developed. The grade obtained in this test will

account for 30% of the final grade. In addition, students will deliver all the reports related to the different problems addressed during the course (65% of the final mark) and will do a self-assessment of their achievement (5%). The format and content of these reports will be indicated at the beginning of the course and could be different from the problems developed during the regular course. These students will be able to participate in classroom sessions and be part of group work without affecting the functioning of the teams. The single assessment test and the deadline for deliveries will coincide with the date of the last assessment activity. The same system for the retake examination and revision of the final qualification and the same criteria for passing will be applied as for the continuous evaluation.

Restricted use of AI by students is permitted. The use of Artificial Intelligence (AI) technologies is permitted for supporting tasks related to the preparation of work deliveries, such as bibliographic, software or information searches, text correction or translation, and image generation. Students must clearly identify which parts have been generated using this technology, specify the tools used, and include a critical reflection on how these tools have influenced the process and the outcome of the activity. Lack of transparency regarding the use of AI in this assessed activity will be considered a breach of academic honesty and may result in a partial or total penalty in the grade for the activity.

IMPORTANT: Any irregularity committed during an assessment activity (such as academic fraud, plagiarism, or the improper use of AI, unless such use is expressly authorised in the course guide) that may lead to a significant change in the grade will result in that assessment activity being awarded a grade of 0. If the course guide establishes that obtaining a minimum grade in that assessment activity is an essential requirement for passing the course, or if several irregularities occur in assessment activities within the same course, the final grade for the course will be 0. In addition, disciplinary proceedings may be initiated against any student who commits any of these irregularities.

Bibliography

It is the responsibility of the student to seek the bibliography necessary for the resolution of the problems raised. To do this he/ she can be advised by the teachers. Still the following textbooks are recommended for basic concepts on genomics concepts and case studies.

- Chaitanya, K. V. (2019). Genome and genomics : from archaea to eukaryotes. (1st ed.) Springer. Disponible en línia

- Preston, Gail M. & Nelson, Karen E. & Pallen, Mark J. (2014). Bacterial Pathogenomics. John Wiley & Sons. Disponible en línia

- Rajora, Om P. (2019). Population Genomics : Concepts, Approaches and Applications. (1st ed.) Springer Disponible en línia

- Tettelin, Hervé & Medini, Duccio. (2020). Pan-genome diversity, dynamics and evolution of genomes. (1st ed.) Springer International Publishing Disponible en línia

- Zhou, Jizhong. (2004). Microbial functional genomics.Wiley-Liss Disponible en línia

Software

There is no specific software for this subject. Each team will prepare its own list of software throughout the course according to the needs that arise from each problem.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift

(TE) Theory	74	Spanish	second semester	morning-mixed