Teaching guide

IDENTIFICATION DETAILS

Degree:	Biotechnology
Scope	Biology and Genetics
Faculty/School:	Experimental Sciences
Course:	VIROLOGY II
Type:	Optional
ECTS credits:	3
Year:	4
Code:	2063
Teaching period:	Seventh semester
Subject:	Molecular Biomedicine
Module:	Biochemistry and Molecular Biology
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	75

Teaching staff	E-mail
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SUBJECT DESCRIPTION

Virology is a science that studies viruses, entities without cellular organization that multiply inside metabolically active cells. In addition, it also deals with the study of subviral particles such as viroids (which infect higher plants), satellites and prions (infectious proteins that cause encephalopathies in mammals).

It's a hugely interesting subject for biotechnology students for several reasons:
(1) viruses are responsible for multiple diseases in all types of hosts, ranging from infectious diseases to some

types of cancer, and
(2) some viruses are used as tools in different molecular biology techniques, for the preparation of vaccines, and as vehicles in gene therapy.

In this course, the singularities of the main families of animal viruses will be studied.

This course is intended to be a continuation of Virology I, understood from the point of view of experimental work in virology laboratories, biotechnological applications of viruses as tools both in basic research and in biotechnology companies, the development of vaccines and antivirals. An attempt will be made to pay particular attention to the social moment in relation to the world of virology.
In this way, the classes will be held in the format of a master class, taught by experts in the field, which will substantially enrich the student experience.

GOAL

The overall objective of this course is to bring students closer to the way of working both in basic science and in biotechnological companies that develop the potential of viruses as a tool for different purposes, relevant to society.

The specific aims of the subject are:

To bring students closer to the work that is carried out in Virology laboratories, achieving the different steps of a line of research.

Understand viruses both as biological agents, but also as biotechnological tools to study everything from the most basic biological processes to more complex ones such as the development of vaccines.

Analyze the possibility of using viruses to control relevant phenomena in society such as pest control or applications in therapies.

Recognize the social and economic impact of viral diseases.

To bring students closer to the reality of virology in basic research or in private companies.

PRIOR KNOWLEDGE

It is important that students have basic knowledge of Virology since the approach of this subject is mainly applied through master classes and will not go into theoretical details.

COURSE SYLLABUS

The contents of the course may vary according to the reality of society at the time and the availability of the speakers. An attempt will always be made to cover the objectives of the subject with content of interest to students. For example, the content of the subject for the 2024/2025 academic year is detailed:
September 12: DNA virus, VPPA pandemic around the world, laboratory work and therapeutic targets. Miguel Ángel Cuesta, Ramón y Cajal Researcher, INIA-CSIC
September 19: Filovirus, its jungle reservoirs1 and the 2014 Ebola epidemic on the ground. Isabel Garcia Dorival, CAM Talent Attraction Researcher, INIA CSIC
September 26: Oncolytic viruses and their application in the treatment of glioblastoma. Carlos Gallego, Postdoctoral Researcher in Oncolytic Viruses, CBMSO-CSIC
October 3: Viral vectors for carrying CRISPR tools. Application of CRISPR in antiviral treatments. Lluís Montoliu, Scientific Researcher and Deputy Director of the CNB-CSIC
October 10: Viruses as biotechnological tools. The example of ALGENEX. Ana Falcón, Chief Operating Officer, Algenex
October 17: Viral vector-based vaccines. Isabel Sola, Scientific Researcher and Coronavirus Group Leader, CNB-CSIC
Oct 24: Alternative models of viral infection. Development and infection in organoids (online). Ferran Tarrés, Postdoctoral Researcher in Zoonotic Viruses, IRTA-CReSA
October 31: Response of Public Health laboratories to health alerts or emergencies caused by viruses: from the national level to the international level Mª Dolores Fernández. Specialist in Public Health Microbiology, ISCIII
Nov 7: Present and future of clinical antiviral research. Diego López Mendoza, Global Medical Affairs Lead, Menarini

EDUCATION ACTIVITIES

Participatory expository class: The teaching of this subject is based on the presentation of master classes by speakers who are experts in them. Seminars, round tables and debates: During the class or at the end of the class, concepts will be discussed in the classroom. Depending on the speaker, round tables and debates can be organized to discuss some of the contents of the subject. Completion of individual/group bibliographic works: It will be proposed to read articles related to the topics proposed by the teachers and their subsequent presentation, with particular importance being given to the students' contributions in relation to what they learned from the subject and the proposals for continuing the line of research. Some details may vary depending on the number of students and dates available.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
30 hrs	45 hrs
Participatory exhibition class Seminars, round tables and debates Group work	Stand-alone study Virtual network work

SKILLS

Basic Skills

Students must have demonstrated knowledge and understanding in an area of study that is founded on general secondary education. Moreover, the area of study is typically at a level that includes certain aspects implying knowledge at the forefront of its field of study, albeit supported by advanced textbooks

Students must be able to apply their knowledge to their work or vocation in a professional manner and possess skills that can typically be demonstrated by coming up with and sustaining arguments and solving problems within their field of study

Students must have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that include reflections on pertinent social, scientific or ethical issues

Students must be able to convey information, ideas, problems and solutions to both an expert and non-expert audience

Students must have developed the learning skills needed to undertake further study with a high degree of independence

General Skills

To be familiar with the applications of biotechnology in the healthcare, food, agrobiotechnological, environmental and chemical fields.

To understand the social, economic and environmental implications of professional activity.

To have acquired the ability for analytical, synthetic, reflective, critical, theoretical and practical thought.

To value sciences as a cultural fact.

To develop capacity for and a commitment to learning and personal development.

To develop an ability to search for, take in, analyze, sum up and relate information.

To be familiar with the basic principles and theories of human and experimental sciences.

To develop oral and written communication skills.

Specific skills

To define the characteristics, properties and methods for studying viruses.

To be familiar with the molecular mechanisms involved in viral infections and the pathologies produced.

To identify the basic mechanisms and processes of the various human pathologies.

To be able to approach a subject by means of rigorous, profound and comprehensive thought.

To be able to apply the theoretical knowledge acquired for solving problems and practical cases linked to the various subjects.

LEARNING RESULTS

It defines the fundamental characteristics of the different families of animal viruses.

Assess the complexity of the nature of viruses and their ecological, biological and technological implications.

To know the potential of viruses in fields as diverse as healthcare, food, environmental and biotechnology.

Learn about the work in Virology in basic research and in biotechnology companies.

Aptly integrate applied knowledge about Virology with that of other sciences to generate new tools.

Enable reflection on ethical and social responsibilities

LEARNING APPRAISAL SYSTEM

Evaluation Criteria: Multianswer test-type exam with only one correct option. This exam will assess the knowledge acquired about the theoretical content and techniques presented in the classes. The questions will be proposed by teachers who specialize in each topic. It will account for 50% of the final grade (5). Practical work (presentation) by groups (depending on the number of students and days available) on a scientific article related to virology. In this work, the student's vision of the future perspectives that emerges from the article will be of great importance, applying techniques known or explained by the speakers of the subject. It will account for 50% of the final grade (5). In the work, they must report and present the content of the article following the scheme: Abstract: brief summary to tell the content of the article. Introduction: State of the art of the content of the article, where what it provides as a novel will finally be shown. Results: Explain to the class the results obtained by the research group. or Discussion and conclusions: Relate the results obtained with what was known until now in the scientific field of the paper. Explanations for certain controversial results. Finally, explain the conclusions obtained. Comment on the weaknesses detected by students in the publication (if any) and try to propose ways to improve them. Here you can discuss the methods used in the paper. If there aren't any, make a brief substantiated positive review. Finally, students must make a reasoned proposal to continue the article's line of research. They must explain what would be the next objectives to be demonstrated depending on the study paper, the techniques they would use for this purpose and what they hope to conclude. After the exhibition, a round of questions/debate will begin between the teacher, the group of students who made the presentation, and the rest of the students. The participation of the

rest of the students in the form of a court is expected and positively evaluated. The maximum exposure time is 20 minutes (it will be adjusted depending on the number of groups).
Rubric: Adjust to the time: 0.5 Individual presentation: 0.5 Group presentation: 1 Critics/weaknesses: 1 Answers to future questions and proposals: 2 The minimum passing grade will be 5 with the sum of the grades of the multianswer exam and the practical work. For both grades to count, a minimum of 3 must be obtained in the multianswer exam. Failure to achieve these minimum scores will mean not passing the subject and the grade obtained will be the sum of the grades obtained in the multianswer exam and the practical work. Academic dispensation and extraordinary evaluation system: In this case, the evaluation of the subject will be carried out in a similar way electronically, ensuring that the exam is carried out honestly with the use of webcams during its completion. Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the Evaluation Regulations and the University's Coexistence Regulations.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Jane Flint...[et al.]. Principles of virology / 5th ed. Washington D.C :American Society for Microbiology :Wiley,2020.