



COURSE DATA

DATA SUBJECT

Code: 46468
Name: Virosphere
Cycle: Master's Degree
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2251 - Master's Degree in Virology	Facultat de Ciències Biològiques	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2251 - Master's Degree in Virology	Virosfera	COMPULSORY

COORDINATION

SANJUAN VERDEGUER RAFAEL

SUMMARY

The subject "Virosphere" provides an overview of viral diversity, delving into the biology and fundamental properties of the different groups of viruses and subviral agents. Virosphere avoids the usual anthropocentric approach. Emphasis will be placed on omics approaches aimed at the detection and characterization of viruses, including non-culturable viruses. Animal, plant, fungal, bacterial and archaeal viruses will be addressed. From this perspective, the most relevant pathologies caused by viruses in plants and animals will be studied, as well as the process of transmission from animals to humans (zoonosis) and its consequences.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

No specific prior knowledge is required, beyond that necessary to access the Master's program.



COMPETENCES / LEARNING OUTCOMES

2251 - Master's Degree in Virology

Achieve a broad and integrated knowledge of virology that encompasses human, animal, plant and prokaryotic viruses, to identify molecular processes shared by large groups of viruses, and to transfer concepts and techniques from one viral system to another.

Place the specialty in the context of other fields and general knowledge.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should demonstrate self-directed learning skills for continued academic growth.

Students should possess and understand foundational knowledge that enables original thinking and research in the field.

To achieve an integrative knowledge, drawing general conclusions from specific case studies, transferring conclusions to other speciality areas and establishing connections between different subjects.

To develop critical thinking, identifying the limits and biases of knowledge in the field of specialization.

To identify relevant factors in viral infection processes beyond the virus itself and its host, such as co-infections, the composition of the microbiome and others, and to understand how they condition the outcome of a viral infection.

To understand natural processes relevant to the field of specialization.

To understand the population dynamics of viruses and their evolution, as well as to establish associations between virology and different ecological concepts, such as biodiversity, ecosystem characteristics, or climate change.

DESCRIPTION OF CONTENTS

1. Global viral diversity

Viral diversity in natural environments. Gene networks in the virosphere. Paleovirology. Viral metagenomics and virus discovery.

2. Prokaryotic viruses

Introduction to bacterial viruses. Model phages. Phages as regulators of bacterial populations. Phages as gene transfer systems in prokaryotes. Genomic approaches to investigate bacterial-phage interactions. Introduction to archaeal viruses.



3. Plant and fungal viruses

Introduction and main plant viral diseases. Tolerance and virulence in plant viruses. Evolution of host range in plant viruses. Multipartite viruses. Viroids, Geminiviruses. Introduction to viruses in fungi.

4. Invertebrate viruses

Baculoviruses. RNA viruses in arthropods. Ecology of insect viruses. Relevant viruses in other invertebrates. Insects as viral vectors.

5. Vertebrate and veterinary viruses

Pet viruses. Rabies. Fish viruses and their economic importance. Animal coronaviruses. Pestiviruses. Arteriviruses. Asfarviruses. Parvoviruses. Viral vaccination programs in domestic animals and livestock.

6. Zoonoses and emergent viruses

Animal reservoirs of viruses. Factors determining host range. Viral transmission between species. Zoonotic origins and evolution of HIV-1. Pandemic potential of avian influenza viruses. Climate change, insect-borne viruses and viral emergence. Origins and evolution of emerging coronaviruses. Population factors in the emergence of Ebola.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	45,00
Total hours	45,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	61,50
Preparation of lessons	0,00
Preparation for assessment activities	4,00
Resolution of case studies	0,00
Total hours	65,50

TEACHING METHODOLOGY



The course is based on the use of different teaching/learning activities among which the following are included:

- **Lectures**, in which the teacher will provide an overview of the fundamental concepts in each of the topics. Prior to the class, the material presented will be accessible to students through the university's teaching support platform.
- **Invited talks** by national or international experts on a topic related to the subject.
- **Face-to-face review of content** and discussion led by the faculty, which will function as group tutorials. It will serve for the follow-up and, if necessary, continuous evaluation of the students. Likewise, students will raise doubts and questions about the subject.
- **Discussion and debate in the classroom of scientific articles and current issues**, usually as a final part of the subject, where topics of interest will be addressed. For example, questions such as how many different viruses are estimated to exist in nature, whether there are evolutionary relationships between different virus families or whether they have independent origins, whether viroids are relics of the RNA world, why certain types of viruses are more abundant in plants/animals/bacteria than others, whether it is possible to predict pandemics, etc. will be discussed.
- **On-line tutorials**, for the resolution of doubts and specific problems, the raising of questions of interest and debate on current scientific and social issues related to the subject.
- **Autonomous self-evaluation activities**, such as performing tests through Aula Virtual, which allow the students to evaluate their own learning.
- **Autonomous study of materials and contents**, where students will review and, if necessary, expand the knowledge imparted by using notes, presentations, relevant bibliography, etc.
- **Bibliographic review** and synthesis carried out by students (individually or in teams), a voluntary activity where students may review a topic of their choice and preferably present it during class time.

EVALUATION

- **Exam**. It will be held at the end of the course and it will be an indispensable condition to pass the course to obtain at least a score of 5 out of 10. It will preferably be a written test, although it may also be oral if the teacher considers it more convenient.
- **Continuous evaluation** by means of partial tests on each subject through the Aula Virtual platform or an alternative method, as well as class participation. This mode of evaluation will determine between 20% and 40% of the grade obtained in the subject, the rest corresponding to the final exam, unless voluntary assignments are submitted, as indicated in the following section (the need to obtain a 5/10 in



the final exam is maintained regardless of the continuous assessment). In case of failing the subject, the grade obtained in the continuous evaluation will be maintained for the next call, but not for the next course enrollment.

- **Assessment of voluntary work presented by the students**, preferably orally and during class time. When such activities are offered, they may account for up to 20% of the final mark for the subject. In case of failing the subject, the mark for this section will be maintained for the next call and also for the following course enrollment.

The assessment criteria will be the same for both calls for enrolment on the course. It will not be possible to renounce the grade obtained in the course once it has been published.

REFERENCES

- Christon J. Hurst (Ed). 2021. *Studies in Viral Ecology*. Wiley-Blackwell. ISBN-10: 1119608368.
- Carl Zimmer. 2021. *A Planet of Viruses: Third Edition*. University of Chicago Press, ISBN-10: 022678259X.
- Pranay Lal. 2022. *Invisible Empire: The Natural History of Viruses*. India Viking. ISBN-10: 0670095761.
- David Quammen. 2013. *Spillover: Animal Infections and the Next Human Pandemic*. W. W. Norton & Company. ISBN-10: 0393346617.
- Michael G. Cordingley. 2017. *Viruses: Agents of Evolutionary Invention*. Harvard University Press. ISBN-10 : 0674972082.
- Vitantonio Pantaleo, Michela Chiumenti (Eds). 2018. *Viral Metagenomics: Methods and Protocols*. Humana Press. ISBN-10: 1493976826.
- Forest Rohwer, Merry Youle. 2014. *Life in Our Phage World*. Wholon. ISBN-10 : 0990494306.
- Yashpal Singh Malik, Raj Kumar Singh, Mahendra Pal Yadav (Eds). 2020. *Emerging and Transboundary Animal Viruses*. ISBN-10: 9811504016.
- Referencia c8: LinFa Wang, Christopher Cowled (Eds). 2015. *Bats and Viruses: A New Frontier of Emerging Infectious Diseases*. John Wiley & Sons Inc. ISBN-10: 1118818733.
- Joshua S. Weitz. 2016. *Quantitative Viral Ecology: Dynamics of Viruses and Their Microbial*



VNIVERSITAT ID VALÈNCIA

Course Guide
46468 Virosphere

Hosts. Princeton University Press. ISBN-10: 0691161542.