VNIVERSITAT DE VALÈNCIA

Course Guide
46467 Virología General

COURSE DATA

Data Subject	
Code	46467
Name	Virología General
Cycle	Master's degree
ECTS Credits	4.5
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2251 - M.U. en Virología	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2251 - M.U. en Virología	1 - Virología General	Obligatory

Coordination

Name	Department
GELLER ., RON	194 - Genetics

SUMMARY

The subject provides an overview of virology and its impact on society. It will allow the student to become familiar with the main terms and concepts in the area of virology and its historical development, to assimilate the different classifications of viruses, to know the infectious cycle of different types of viruses and to understand the key processes of viral infections at the molecular, cellular, organismal and population levels.

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.

OUTCOMES

2251 - M.U. en Virología

- 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 understand natural processes relevant to the field of specialization.
- 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.
- Place the specialty in the context of other fields and general knowledge.
- 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.
- Know how to differentiate viruses according to fundamental features such as structure, host range, infectious cycle, symptoms, pathogenesis or mode of transmission and apply the most appropriate theoretical and experimental analysis tools.
- To develop critical thinking about the social, economic, ethical or philosophical implications of a given knowledge in virology.
- Approach the same virological process from different angles, such as mechanistic, evolutionary, biomedical and biotechnological.

LEARNING OUTCOMES

Acquire an overview of virology and its impact on society.

To understand the common characteristics of different viruses.

To classify and perform a comparative analysis of viruses according to their fundamental properties.

To know viral diversity and evolution, as well as their biological, biomedical and biotechnological importance.

To understand key processes of viral infections at the molecular and cellular level.

To conceptualize virus-cell and virus-virus interactions beyond the specific details of each system.

To acquire a critical view of virology and to question established dogmas in a reasoned manner.

DESCRIPTION OF CONTENTS

1. Introduction to virology

Viruses and history. Importance of viruses today. Beginnings of virology as a scientific discipline. Global diversity of viruses. Classifications and nomenclature of viruses. Evolutionary origin of viruses.

2. The infectious cycle

How viruses gain access to cells. Generalities of the infectious cycle in eukaryotic viruses. Comparison of RNA+, RNA-, dsRNA, retroviruses and para-retroviruses, small DNA viruses and large DNA viruses. Viral dissemination and transmission. Bacteriophages. Regulation of lysis-lysogeny in phages. Latency.

3. Molecular and cellular effects of viral infection

Initial cellular responses to infection. Sequestration and blockade of cellular factors by viruses. Modification of cellular architecture. Function of viral microRNAs. Molecular mechanisms and function of cell transformation. Infection in the presence of cellular mechanisms of immunity.

4. Virus-virus interactions

Coinfection. Viral pseudotyping. Collective transmission of viruses. Cooperation and competition between viruses.

5. Population and evolutionary virology

Dynamics of viral populations. Viral mutation mechanisms. Viral recombination and diversity. Viral evolution rates. Fundamentals of epidemiology. Virulence optimization theory.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	45,00	100
Study and independent work	49,00	0
Readings supplementary material	12,00	0
Preparation of evaluation activities	4,00	0
TOTAL	**110,00**	

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. This mode of evaluation is optional and will be carried out if the teacher considers it appropriate. If implemented, it will determine between 20% and 40% of the grade obtained in the subject, the rest corresponding to the final exam (the need to obtain a 5/10 in the final exam is maintained regardless of the continuous assessment). In case of failing the course, the grade obtained in the continuous evaluation will be maintained for the next call, but not for the next enrollment.

- **Assessment of voluntary work presented by the students**, preferably orally and during class time. These works may increase the final grade by up to 2 points out of 10. In case of failing the course, the grade of this work will be maintained for the next call and also for the following enrollment.

It will not be possible to renounce the grade obtained in the course once it has been published.

REFERENCES

Basic

- Knipe, D.M., Howley, P.M. 2020. Fields Virology: Emerging Viruses. 7ª ed. Wolters Kluwer/Lippincott, Williams & Wilkins, Philadelphia. ISBN-10 : 1975112547
- Knipe, D.M., Howley, P.M. 2021. Fields Virology: DNA Viruses 7ª ed. Wolters Kluwer/Lippincott, Williams & Wilkins, Philadelphia. ISBN-10 : 1975112571.
- Knipe, D.M., Howley, P.M. 2022. Fields Virology: RNA Viruses 7ª ed. Wolters Kluwer/Lippincott, Williams & Wilkins, Philadelphia. ISBN-10 : 1975112601.
- Lostroh, P. 2021. Molecular and Cellular Biology of Viruses. 1st ed. Garland Science. ISBN-10 : 0815345232
- Jane Flint, Vincent R. Racaniello, Glenn F. Rall, Theodora Hatziioannou, Anna Marie Skalka. 2020. Principles of Virology. 5th edition. Wiley. ISBN-10 : 1683670329.

Additional

- Sompayrac L. 2012. How pathogenic viruses think. Making sense of Virology. Jones & Bartlett Learning. ISBN-10 : 9781449645793