

ETS Ingeniería Agronómica, Alimentaria y de Biosistemas	
Program	20BT– Degree in Biotechnology

Course number and name	
Number	20504324
Name	Virology
Semester	S2 [(February - June)], 3 rd Year

Credits and contact hours	
ECTS Credits	5
Contact hours	60

Coordinator's name	Fernando García-Arenal Rodriguez fernando.garciaarenal@upm.es
Professors' name	Soledad Sacristán Benayas soledad.sacristan@upm.es Jesús Israel Pagan Muñoz jesusisrael.pagan@upm.es María Angeles Ayllón Talavera mariaangeles.ayllon@upm.es

Specific course information
<p>Description of course content</p> <p>UT1. Introduction to Virology. Virus concept. Discovery and classification of viruses. Milestones in the development of virology and its contribution to biology and biotechnology</p> <p>UT2. Molecular biology of viruses. The capsid protein and the packaging of the viral genome. Other components of viral particles. Tubular viruses, isometric viruses, enveloped viruses and complex structures. Viral structures as a model of macromolecular interactions. Diversity of viral genomes. Variability and genetic constraints of viral genomes. Expression gene: internal gene expression strategies and translation of non-canonical messengers. Entry and disassembly of the virus within the cell. RNA virus replication on RNA template (Bromovirus and Picornavirus). Replication of RNA viruses on DNA template (retroviruses). Virus replication single-stranded DNA (Begomovirus) and double-stranded DNA (Poliomavirus, Adenovirus, Herpes). Infection cycles of lytic viruses. Infection cycles of persistent viruses. Symplastic colonization of plant tissues</p> <p>UT3. Pathogenesis, Control and Evolution of Viruses. Altered host gene expression. Host susceptibility to viral infection. Immune response. Interferon and genes regulated by interferon. RNA silencing. Genetic resistance in plants. Modes of virus transmission. Virus-vector interaction in arboviruses. Interference with the transmission of viruses. Origin and evolution of viruses. Emergence of new viruses. Vaccines. Antivirals</p>

List of topics to be covered

- UT1. Introduction to Virology
 1.1. Introduction
- UT2. Molecular biology of viruses
 2.1. Structure of the viral particle
 2.2. Structure and function of viral genomes
 2.3. Infection and replication
 2.4. Colonization of the infected host
- UT3. Pathogenesis, Control and Evolution of Viruses
 3.1. Pathogenesis
 3.2. Host defenses
 3.3. Transmission of viruses
 3.4. Prevention and control of viral diseases
 3.5. Viral evolution and emergence of new viruses

Prerequisites or co-requisites

- Molecular Genetics and Regulation of Gene Expression
- Microbiology

Course category in the program

Mandatory

Specific for course objectives

Specific learning outcomes

- RA213 - Know the morphological, structural and compositional characteristics of the virions of the most important virus families
- RA210 - Distinguish the structural elements and composition of viruses, viroids and prions
- RA217 - Know the most important diseases caused by viruses
- RA215 - Know the ability of virus populations to vary and evolve and methods for their analysis
- RA218 - Know the most important diseases caused by viruses
- RA212 - Know the basic techniques available for the study of viruses
- RA216 - Understand the implications of the variability of virus populations in the diagnosis and control of diseases that produce
- RA214 - Relate the viral replication model and target cells of each of them with the pathogenesis of the disease and diagnostic, therapeutic and prophylaxis possibilities
- RA219 - Know the applications of Virology in Biotechnology
- RA211 - Understand the need for viruses to be intracellular pathogens and describe the phases of invasion cell and replication of viral particles

Further reading and supplementary materials

Bibliography

- Flint, Enquist and Racaniello, 2009. Principles of Virology. Tercera Edición, 2 volúmenes. ASM Press, New York.

- Hull, R. 2002. Mathews Plant Virology. Academic Press, New York.
- King et al. 2012. Virus taxonomy. 9th Report of the International Committee on Taxonomy of Viruses
- <http://www.dpvweb.net/dpv/> Descriptions of plant viruses
- <http://viralzone.expasy.org/> A knowledge resource to understand virus diversity

Supplementary materials

- Spectrophotometer for virus quantification
- Plants for inoculation with different species of tobamovirus and for virus quantification by local injury test.
- Tools for virus purification and viral nucleic acid extraction (mortars, pipettes, centrifuges, etc).

Teaching methodology

-- lectures	-- problem solving sessions	_ collaborative actions	-- laboratory sessions
Other:			

Evaluation Criteria

The final grade must be 5 out of 10 to pass the course, taking into account the following criteria:

- Evaluation of practices (delivery of a written summary of the practice carried out each day with the obtained results and reasoning thereof). Both laboratory practices and the summary report are mandatory. These practice mark constitutes 20% of the final grade.
- Final exam accounts for 66% of the final grade in the progressive assessment. The knowledge acquired throughout the course will be evaluated through this exam. It will consist of short questions and problems. A minimum of 5 out of 10 in the final exam is necessary to pass the course
- Surprise tests performed in class and the participation of the students are also evaluated, accounting for 16% of the final grade.

For the extraordinary evaluation final exam accounts for 80% of the final grade and the practices should also be passed.