Virology
Code: 101002
ECTS Credits: 6

<table>
<thead>
<tr>
<th>Degree</th>
<th>Type</th>
<th>Year</th>
<th>Semester</th>
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<tbody>
<tr>
<td>2500502 Microbiology</td>
<td>OB</td>
<td>2</td>
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</tr>
</tbody>
</table>

Contact
Name: Neus Ferrer Miralles
Email: Neus.Ferrer@uab.cat

Use of languages
Principal working language: english (eng)
Some groups entirely in English: Yes
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages
Classes are given in English

Teachers
Antonio Villaverde Corrales
Esther Vazquez Gomez

Prerequisites
Is essential to have a good level of spoken and written English and a general background in Biochemistry, Molecular Biology, Cell Biology, Microbiology and Immunology.

Objectives and Contextualisation
The teaching objectives of the course are the acquisition by students of basic knowledge about the biology, structure, genetics and evolution of viruses within the framework of its pathogenesis and pharmacological possibilities and research opportunities virology can offer in those fields. It will be also focused on emerging applications of the viruses in biotechnology and nanotechnology, and the need for constant updating of information through bibliographic databases.

Skills
- Apply microorganisms or their components to the development of products of interest in health, industry and technology.
- Apply suitable methodologies to isolate, analyse, observe, cultivate, identify and conserve microorganisms.
- Characterise the causal agents of microbial diseases in humans, animals and plants in order to diagnose and control them, perform epidemiological studies and be aware of present-day problems with these diseases and strategies to combat them.
• Identify the molecular mechanisms of pathogenesis and relate them to the response to infection in order to design and develop strategies for diagnosing and combating diseases caused by microorganisms.
• Obtain, select and manage information.
• Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
• Work individually or in groups, in multidisciplinary teams and in an international context.

Learning outcomes

1. Identify and describe the microorganisms used in bioterrorism.
2. Identify the techniques used in the conservation and storage of microorganisms.
3. Identify the techniques used in the multiplication, detection and identification of viruses.
4. Identify viral elements that are useful for the design of antigens, immunogens and vaccines.
5. Identify viral elements that are useful for the design of diagnostic reagents.
6. Know and identify the biotechnological and nanomedical applications of viruses in microelectronics, as biosensors and for controlled drug delivery.
7. Know the molecular bases of viral invasiveness and virulence and recognise the value of attenuated viral variants in vaccine design.
8. Know the molecular processes of the viral cycle and identify the potential targets of antiviral drugs.
9. Know the most important groups of pathogenic microorganisms.
10. Obtain, select and manage information.
11. Understand the microbiological bases that are used to develop products of interest in healthcare.
12. Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
13. Use omics techniques for identifying target genes and proteins related to pathogenicity and virulence, and usable in the design of vaccines and antimicrobial compounds.
14. Work individually or in groups, in multidisciplinary teams and in an international context.

Content

1. An introduction to viruses and Virology


2. Historical overview of virology


3. Viral structure


4. Viral genomes and genetics

5. Viral multiplication


6. Origin and evolution of viruses


7. Emerging viruses and viral diseases


8. Prions and viroids


9. Bacteriophages


10. Methods in Virology


11. Viral taxonomy

12. Viral pathogenesis


13. Responses to viral infection


14. Artificial viruses

Viral gene therapy; important features and biological risks. Artificial viruses as alternatives to viral gene therapy. Type of artificial viruses and used biomolecules. Modular strategies. Selection of functional domains. Examples and applications of artificial viruses.

Methodology

The course will comprise classroom lectures and active learning activities with scientific problems and cases by which students will acquire skills necessary to perform literature research, propose experimental approaches and design problem solving strategies. Oral presentations of active learning activities will encourage teamwork, coordination of activities and rational presentation of work plans and results. Active learning activities will be focused on methodological aspects and biomedical, biotechnology, pharmaceutical and nanotechnological applications of virus as well as derived viral structures. Personal tutorial guidance sessions will be available by email appointment and will be held in the office C3/331. In those sessions, students will have the opportunity to receive individual guidance according to their needs.

Activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type: Directed</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Active learning activities</td>
<td>15</td>
<td>0.6</td>
<td>10, 14, 12</td>
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<tr>
<td>Lectures</td>
<td>30</td>
<td>1.2</td>
<td>11, 9, 8, 6, 7, 4, 5, 1, 2, 3, 13</td>
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<tr>
<td><strong>Type: Supervised</strong></td>
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<tr>
<td>Personal tutorial guidance sessions</td>
<td>2</td>
<td>0.08</td>
<td>11, 9, 8, 6, 7, 4, 5, 1, 2, 3, 10, 14, 12, 13</td>
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<tr>
<td><strong>Type: Autonomous</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Literature search</td>
<td>28</td>
<td>1.12</td>
<td>10, 12</td>
</tr>
<tr>
<td>Personal study</td>
<td>45</td>
<td>1.8</td>
<td>11, 9, 8, 6, 7, 4, 5, 1, 2, 3, 13</td>
</tr>
<tr>
<td>Reading</td>
<td>20</td>
<td>0.8</td>
<td>10, 14</td>
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</table>

Evaluation
The evaluation will be done through one midterm exam and one final exam. The sum of the marks obtained in the evaluation of all written exams will represent 70 % of the final grade (10 % and 60 % respectively). Remedial exam will be scheduled for the final exam. 30 % of the grade will be obtained by oral and written presentations of assignments and classroom problem-solving activities. The mark obtained in the final exam (or remedial exam) must be higher than 4.5 to be used in the final mark calculation. In the case of obtaining a lower mark than 4.5 in the final exam (remedial exam), the maximum mark would be 4.

Evaluation of classroom lecture competencies (70 % of final grade)
-During the course two written tests will be scheduled for this evaluation form. The first test will have a weight of 10% and the second a weight of 60%.
-Evaluation of oral and written presentations (30 % of the final grade)
-Students will present the reports of the assigned active learning exercises in classroom sessions. Oral presentations will be evaluated on content, organization and communicative skills. Additional written reports will be evaluated on content and organization.
-Delay in the delivery of activity assignments will represent a 100 % reduction in the mark obtained in the evaluated activity.

We consider that a student will be graded as "NO AVALUABLE" if the assessment of all conducted evaluation activities does not allow students to achieve the overall grade of 5 on the assumption that they had obtained the highest grade in all of them.

### Evaluation activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Weighting</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning outcomes</th>
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<tbody>
<tr>
<td>Final exam</td>
<td>60 %</td>
<td>3</td>
<td>0.12</td>
<td>11, 9, 8, 6, 7, 4, 5, 1, 2, 3, 13</td>
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<tr>
<td>First midterm exam</td>
<td>10 %</td>
<td>2</td>
<td>0.08</td>
<td>9, 7, 1, 2, 3</td>
</tr>
<tr>
<td>Oral and written presentation of reports</td>
<td>30 %</td>
<td>5</td>
<td>0.2</td>
<td>10, 14, 12</td>
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</tbody>
</table>

### Bibliography


http://www.sciencedirect.com/science/referenceworks/9780123744104


