

LF213-15 Virology

20/21

Department

Life Sciences

Level

Undergraduate Level 2

Module leader

Emma Anderson

Credit value

15

Module duration

5 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

The content in this Virology section of LF213 (Infection) builds on the introductory first year virology component of BS127 Agents of Infectious Disease.

This component covers the replication strategies of important viruses, antiviral therapies, diagnosis and clinical case studies. Viral replication strategies, within their cellular context, are the cornerstone of all virology – telling us how viruses reproduce inside our cells – and will be required knowledge for Virology modules in the final year of Virology and Biomedical Science degree courses. The medically related aspects of virology (how virus infections are diagnosed and treated) are important in combating viral disease, which should be of particular interest to both virologists and biomedical scientists.

Module aims

The aim of the module is to explain the biology of important viruses. Through study of a variety of microbes, students will gain an appreciation of the diversity of pathogens and pathogenic mechanisms in human infectious disease.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be

covered. Actual sessions held may differ.

Lectures 1-9: Viral Replication Strategies

1-3. Viruses as pathogens, effects on the host, role of the immune system. Introduction to viral replication, summary of the different types of viral genome. Influenza virus replication. Entry into cell and site of replication. Segmented genome structure. Transcription/replication of genome, translation of virus proteins. Assembly and exit from the cell.

1. Measles. Entry into cell. Non-segmented genome structure. Transcription/replication of genome. Transcriptional regulation. RNA editing. Assembly and exit from the cell.

5-7. Retroviruses, specifically HIV. Genome structure. Receptor binding and entry. Reverse transcription, integration into host cell genome. Transcription and nuclear export of RNA. Ribosomal frameshifting. Assembly and maturation.

Hepadnaviruses, specifically hepatitis B virus. Structure of genome. DNA completion and repair. Transcription and translation. Reverse transcription. Assembly and exit from the cell. Comparison of hepadnaviruses and retroviruses.

1. Herpesviruses. Entry into cell and site of replication. Genome structure. DNA replication. Temporal phasing of gene expression. Packaging of genomes into viral particles.

2. Poliovirus replication. Entry into cell. Genome structure. Gene expression and protein production. Assembly and exit from the cell.

Lectures 10-16: Prevention, Diagnosis and Treatment of Viral Infections

10. Vaccination, using poliovirus as an example. Worldwide eradication attempts.

11. Diagnosis. Types of approach used in routine diagnosis, traditional versus new rapid methods. Direct detection of virus / viral components versus detection of specific immune responses.

12-14. Antiviral therapy. Rationale of antiviral drugs. Approaches to drug design including high throughput screening and rational design. Drug development and testing in clinical trials. Antiviral drugs used in the treatment of herpesviruses, influenza and HIV.

15-16. Principles of case management illustrated through clinical case studies.

Learning outcomes

By the end of the module, students should be able to:

- Level 5 understanding of the epidemiological factors involved in the invasion, spread, and colonisation of pathogens
- Level 5 understanding of how viruses evade the host immune system
- Level 5 understanding of the techniques used in the diagnosis of infection, and both current and novel approaches to their control will be discussed.
- Level 5 understanding of the impact of infectious disease over the centuries and how they have been perceived and dealt with by society
- Level 5 understanding of the the replication strategies of selected RNA viruses, DNA viruses and retroviruses, and the fundamental differences between them
- Level 5 understanding of the role of clinical microbiologist in determining the nature of the infection and subsequent treatment is dealt with.

- Level 5 understanding of the different types of current antiviral therapy, how they are discovered, developed and trialled

Indicative reading list

Dimmock, N. J., Easton, A. J. and Leppard, K. N. Introduction to Modern Virology, 7th edn. (Wiley-Blackwell, 2016).

Other books to consult:

Collier, L. and Oxford, J. Human Virology, 3rd edn. (Oxford University Press, 2006).

Mims, C. A., Nash, A. and Stephens, J. Mims' Pathogenesis of Infectious Disease, 5th edn. (Academic Press, 2001).

Subject specific skills

Explain epidemiological factors involved in the invasion, spread, and colonisation of pathogens, and the host defense systems that they have to overcome.

Understand techniques used in the diagnosis of infection, and both current and novel approaches to their control will be discussed. We will also look at the impact of infectious disease over the centuries and how they have been perceived and dealt with by society.

Understand the replication strategies of selected RNA viruses, DNA viruses and retroviruses, and the fundamental differences between them.

Understand the principles of diagnosis of viral infections.

Understand the different types of current antiviral therapy, how they are discovered, developed and trialled.

Transferable skills

Adult learning,
self directed learning,
team based learning
quantitative skills

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (7%)
Practical classes	3 sessions of 6 hours (8%)
Total	225 hours

Type	Required
Private study	117 hours (52%)
Assessment	75 hours (33%)
Total	225 hours

Private study description

117 hrs of self directed learning and revision

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time
Virology Lab	30%	30 hours
Virology Practical class (2 x 6 hr sessions)		
Online Examination	70%	45 hours
45 min short answer paper / 45 min essay paper		

- Online examination: No Answerbook required

Assessment group R

	Weighting	Study time
In-person Examination - Resit	100%	
45 min SAQ paper / 45 min essay paper		

- Answerbook Green (8 page)
- Students may use a calculator

Feedback on assessment

Pastoral tutorial with academic tutor

[Past exam papers for LF213](#)

Availability

Courses

This module is Core for:

- UBSA-C1B9 Undergraduate Biomedical Science
 - Year 2 of C1B9 Biomedical Science
 - Year 2 of C1B9 Biomedical Science
 - Year 2 of C1B9 Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
 - Year 2 of C1A3 Biomedical Science
 - Year 2 of C1B9 Biomedical Science
- Year 2 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- ULFA-CB18 Undergraduate Biomedical Science with Placement Year
 - Year 2 of CB18 Biomedical Science with Placement Year
 - Year 2 of CB18 Biomedical Science with Placement Year
 - Year 2 of CB18 Biomedical Science with Placement Year