

Title: Advanced General Virology (VIR 1070). Course policy and welcome notes.**Date: October 2021.****Author: Ausama A. Yousif, DVM, MSc, PhD.****Dear future colleagues,**

For every cellular organism on this earth, there is a virus. Viruses impact our health, economy, and environment. Many viruses are looked upon as dangerous threats because numerous viruses cause devastating human, animal, and plant diseases. However, viruses are, in fact, one of the guardians of the planet's ecosystems. How this is done is indirect. For example, microorganisms constitute more than 90% of the biomass in the sea. It is estimated that viruses kill approximately 20% of this biomass each day and they are the main agents responsible for the rapid destruction of harmful algal blooms, which often kill other marine life. The effects of marine viruses are far-reaching; by increasing the amount of photosynthesis in the oceans, viruses are indirectly responsible for reducing the amount of carbon dioxide in the atmosphere by approximately 3 gigatons of carbon per year¹. In addition, endogenous viral elements (EVE) are responsible for tuning the host immune responses and for enhanced responses to poorly immunogenic antigens, such as T cell-independent type 2 antigens or tumors².

The study of viruses has given man insights into a myriad of sciences and applications. Major developments in immunology, molecular biology, vaccinology, mutation, evolution, and even material sciences and nanotechnology, were only possible by the study of virus models. It is for this reason that we will focus our study on the basic concepts of virology without venturing too far into diseases caused by viruses (other courses will be more appropriate for that).

I will try to integrate applied information into every concept discussed. I will also make sure that the practical aspects of the science (e.g. in-vitro cultivation, and molecular diagnosis) are discussed alongside the theoretical subjects. However, because of time limitations, some important topics related to the science will be left for future courses (e.g. genetic engineering of viruses, and modern vaccinology). Only major outlines of the latter topics will be included in our study this semester.

As you shall soon discover, there is a lot to be gained by our study of viruses on the personal and national levels. Virology is an integral part of many of today's biotechnological applications; therefore, it is an integral part of our program at the Faculty of Veterinary Medicine, Cairo University.

Course objectives

1. To help students understand the impact of viruses on the earth and all its inhabitants.
2. To explain the basics of virus structure.
3. To allow students to understand the bases of virus classification.
4. To demonstrate select models of viral replication strategies.
5. To help students understand select models of pathogenesis of viral infections.
6. To outline the immune response to viral infections and select models of viral evasion of the immune response.
7. To give students an in-depth view of the mutation and evolution of segmented viruses using the influenza model.

¹ [Suttle CA. Marine viruses-major players in the global ecosystem. *Nature Reviews. Microbiology.* 2007; 5(10):801–12. doi:10.1038/nrmicro1750. PMID 17853907.]

² [Immune responses to endogenous retroelements: Taking the bad with the good. *Nature Reviews. Immunology.* 2016;16(4):207–219]

8. To discuss the bases of viral zoonoses.
9. To discuss the basic concepts of virus identification and characterization.
10. To allow students to practice virus cultivation and purification.
11. To overview strategies for control of viral infections in human and animal models.
12. To provide students with an understanding of the economic importance of viruses, and examples of their role in today's biotechnology industry.

Course Requirements and Policy

1. I will teach the theoretical parts of this course in person and online. I will be present in person during classes. You can attend in person or online for the theoretical lectures.
2. Teaching, exams, and reports will be in English. Please, try to use English as well in discussion.
3. Starting from the second week, you will be given reading material. You are advised to "read" the material prior to the date when it is due to be discussed.
4. While you are in class, you are required to participate actively in the discussions pertaining to the subject matter. **Remember you are a future scientist.**
5. At the end of each session, you (as a group) will be required to write 10 questions related to the lecture.
6. You are required to **make a concise scientific review* (5 pages (including the cover page and references page), single spaced, 12 pts, Times New Roman)** on a topic related to the molecular bases for epidemiology or zoonosis.
7. You are required to **present your short review***.
8. You are required to hand in a **one-page experimental design*** aimed at solving a problem related to the topics discussed. Select topics that also solve community problems if you can.
9. The dates for handing-in assignments are fixed; if you miss one, you can hand it the following week for only 50% of the grade for that assignment.
10. The practical items will be covered by in separate sessions. You will be provided with appropriate course materials.
11. There will be two pop exams for an **Extra 5%** of the total grade.
12. Plagiarism is prohibited and will not be tolerated. The simplest description of plagiarism is defined by "claiming that something is yours while "in-fact" it is the work and thought of someone else". You **MUST** think; write using your own style, and reference people that have helped to create your own ideas and style. **YOU WILL FAIL IF YOU COMMIT PLAGIARISM.**

Teaching materials and internet sites

The recommended reading materials are:

1. Fenner's Veterinary Virology - 4th Edition. N. James Maclachlan and Edward J. Dubov. Academic Press 2011. ISBN: 9780123751584. Chapters 1-6 are required.
2. Principles of Molecular Virology. 4th Edition. Alan J. Cann. Elsevier Academic Press. 2005. ISBN (Standard Edition): 0-12-088787-8.
3. Viral Pathogenesis and Immunity. Second edition. Neal Nathanson, Rafi Ahmad, et al. Elsevier Academic Press. 2007. ISBN-13: 978-0-12-369464-5.
4. <http://www.virology.net/>

Attendance policy

Students are required to attend at least 75% of the number of classes. Online and in person attendance is acceptable for theoretical lectures. Please, log in on time. In person attendance is mandatory for the practical sessions.

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Course Coordinator

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*Activities and % of final grade:

Activity	Objective	% of grade
Concise review (written).	Practice scientific communication skills. Encourage creative thinking. Practice reporting and organization.	10%
Experimental Design (written).	Encourage creative thinking. Practice reporting and organization.	5%
Presenting the concise review (Oral or Poster presentations).	Practice scientific communication skills. Practice reporting and organization.	5%
Oral exam	Evaluate competence in linking concepts and knowledge to develop logical solutions. Evaluate ability to communicate scientific ideas related to course topics.	10%
Laboratory Exam	Measure ability to apply practical knowledge in basic virological investigations.	20%
Final Exam	Measure student outcome, and rank students.	50%
Pop test 1	Encourage regular study, creative thinking, and timely attendance. It is also applied to measure certain aspects of student retention.	Extra Credit 2.5%
Pop test 2	Encourage regular study, creative thinking, and timely attendance. It is also applied to measure certain aspects of student retention.	Extra Credit 2.5%

End