



Department of Biology

College of Science

University of Salahaddin

Subject: Virology

Course Book: Third Class

Lecturer's name:

Theory: Taban K. Rasheed, PhD

Practical: Sonia Elia Ishaq, M.Sc.

Academic Year: 2023/2024

Course Book

1. Course name	Virology
2. Lecturer in charge	Theory/ Asst.Prof.Dr.Taban K. Rasheed Practical/ Sonia E. Ishaq
3. Department/ College	Biology/Science
4. Contact	E-mail: taban.rasheed@su.edu.krd Sonia.ishaq@su.edu.krd
5. Time (in hours) per week	Theory: 2hr./week Practical: 2hr./week
6. Office hours	To be return to the schedule on the office door of the instructors
7. Course code	SBIO305
8. Teacher's academic profile	<p>Asst.Prof.Dr. Taban Rasheed: I graduate from Salahaddin University in 1991(Ranked 5th in collage) worked as assistant biology for three years. In 1997 I finished my MSc degree in HBV and start as Assistant Lecturer Teaching Practical Immunology, Practical Virology, Practical Mycology, Practical Medical Microbiology, and Practical Invertebrate Biology.</p> <p>In 2008 I get my PhD degree in Micro-immunology and from that time, I am in charge in teaching Immunology theory for 4th class students, teaching Virology theory for 3rd class students, Supervising Immunology and Virology Practical Laboratory, Teaching Advanced Immunology for Graduate student.</p> <p>In 2010 I was honored to be among the 25 Iraqi university staff that have been selected to visit USA through Fulbright Visiting Program for faculty development and capacity building. In 2011, I was accepted as a research fellow in George Mason University-Prince William Campus in Molecular and Microbiology Laboratory in USA to study HIV virus.</p> <p>M.Sc. Sonia Ishaq: I graduated from Salahaddin University in 2011. In the same year I became an employee in college of science/ biology department. I worked as an assistant biology in practical laboratory especially in microbiology lab, food microbiology and mycology lab.</p> <p>In 2016, I got my master degree in biology/immunology</p>

	and worked as assistant lecturer in practical biochemistry, practical virology, practical immunology and practical invertebrate.
9. Keywords	<p>Theory: Virus, Structure, Virus Replication, DNA Virus, RNA Virus, Virus Infection and Immune Response to Virus, Physical and chemical properties and moreover their pathogenicity and Antigenicity.</p> <p>Practical: Virology Lab. Instruments, safety cabinets, Virological samples, cell culture technique, Chick embryo technique and Harvesting of chick embryo</p>
<p>10. Course overview:</p> <p>Theory: Virology literally means the study of viruses. Viruses are most often associated with disease but many are surprised to learn that they can be the cause of cancer and even be used to transmit genes between cells in the laboratory. Diseases caused by viruses include, encephalomyelitis, the common cold, influenza, AIDS, herpes, hepatitis, haemorrhagic fever and many others. It is important to understand that a disease caused by a virus cannot be treated with antibiotics (e.g. the common cold) although antiviral compounds exist that can treat viral infections. A virus is not a living organism because it cannot reproduce without a host cell. It is simply a protein capsule that contains nucleic acids (DNA or RNA) that is released into cells and in many cases causes disease. The subject will cover the strategies that different groups of viruses employ to replicate in host cells, and their mechanisms for manipulating cellular biochemistry for their own ends. The different outcomes possible for both the virus and the host cell, including clearance, persistence, carcinogenesis, and immunodeficiency, will be discussed. Also covered will be how viruses may be transmitted and detected, and the pathogenic process. The host immune response to infection and the various mechanisms used by viruses to evade the host's defences will also be explored.</p> <p>Practical: The course covers the fundamental principles related to the practical virology. The hands-on practical component is designed to enhance students' practical skills and to complement the lecture series by introducing students to cell culture, cytopathic effect, serology and molecular detection techniques.</p>	
<p>11. Course objective:</p> <p>Theory:</p> <ul style="list-style-type: none"> • Explores basic virology, virus structure, virus replication strategies, and international classification of virus. • Explanation of the infectivity of viruses that cause various diseases in humans. • Students to be aware about the different families of DNA and RNA viruses. • Virus infection, Immune Response to virus, cellular immunity, Humoral Immunity, • Evasion of Immune Responses by Viruses. 	

Practical:

- Isolation of Bacteriophages from sewage water
- Preparation of primary cell culture (PCC)
- Chick embryo technique
- Harvesting of chick embryo
- Detection of viruses by ELISA technique

12. Student's obligation

***Exam policy:** Student Should take 1 exam. during the course There will be no make-up exams for absences students without medical report.

***Classroom polices:**

1- Attendance: You are strongly encouraged to attend class on a regular basis, as participation is important to your understanding of the material. This is your opportunity to ask questions. **You are responsible for obtaining any information you miss due to absence**

2- Lateness: Lateness to class is disruptive

3-Electronic devices: All cell phones are to be turned off at the beginning of class and put away during the entire class.

4-Talking: During class please refrain from side conversations. These can be disruptive to your fellow students and your professor

5- No Disrespectful to both the professor and to your fellow students.

13. Forms of teaching

Face-to-Face (Lectures and PowerPoint)

14. Assessment scheme

Component	Date	Percent
Basic Virology Theory 1 st Exam. In class assignments and Discussion Dr.Taban Rasheed	00/00/2023	12% 3%
Practical Virology Exam. Homework/In class assignments / Discussion/attendance Sonia Ishaq	00/00/2023	25% 10%
Total		50%

15. Student learning outcome:

Theory: After completion of this course, you will be able to:

- Define common terms used in virology and the history of virology.
- Identify all the possible methods for diagnosis of virus
- Different structure and shape of virus
- Analyze virology as they relate to different human disease.
- Identify International classification of virus
- Compare different virus replication strategies and genome coding strategies
- Relation of Viruses to different kind of Cancer
- Demonstrate the way for viral vaccine development

- Immune Responses to Viruses.

Practical: After completion of this course, you will be able to:

- Understand the principle and operation of relevant laboratory equipment
- Work safely in a laboratory.
- Able to select the suitable sample and the suitable laboratory test for diagnosis
- Ability to understand different methods of laboratory diagnosis
- Practice different methods used for isolation of viruses and their identification.

16. Course Reading List and References:

Theory

- Cann, A.J. (2005). *Principles of Molecular Virology* (4th Ed.) Elsevier Academic Press.
- Brooks, G.F., Carroll, K.C., Butel, J.S. & Morse, S.A. (2007) *Medical Microbiology* (24th Ed.) NY, McGraw Hill.
- Greenwood, D., Slack, R., Peutherer, J. & Barer, M (2007) *Medical Microbiology* (17th Ed.) Churchill Livingstone Elsevier.
- *A textbook of Virology and Viral Diseases*, by Dilip K. Sharma, 2009.
- *The Merck Manual*, 9th edition, 1998

Practical

- Versteeg, J. (1985). *A colour atlas of virology*: Wolfe Medical Publications Ltd.
- Rovozzo, G.C., Burke, C.N. (1973). *A manual of Basic Virological Techniques*: Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

17. Theory Topics:	2 hr./week
Viruses are Distinct from Living Organisms. The History of Virology. Living Host Systems.	13/09/2023
Virus Structure, Virion Nucleocapsid Structure, Unconventional agents	20/09/2023
International Classification of Viruses, Virus Replication Strategies Genome Coding Strategies. Transcriptional Control of Expression. Post-Transcriptional Control of Expression.	27/09/2023
DNA Virus Parvoviridae, Hepadnaviridae	04/10/2023
polyoviridae, papillomaviridae, Adenoviridae,	11/10/2023
Herpesviridae, poxviridae	18/10/2023
Virus Infection and Immune response to virus & Interferons and Evasion of immune response by virus	25/10/2023
RNA Virus /+ve sense Picornaviridae, Calciviridae, Coronaviridae	01/11/2023
Flaviviridae, Togaviridae, Retroviridae	08/11/2023
RNA Virus /-ve sense, Arenaviridae, Bunyaviridae, Filoviridae	15/11/2023
Rhabdoviridae, Paramyxoviridae, Orthomyxoviridae, dsRNA viruses	22/11/2023

Virus Infection and Immune response to virus&	29/11/2022
Interferons and Evasion of immune response by virus	06/12/2023
2 Weeks Examination in Between (depend on university schedule)	
18. Practical Topics	3hr./week
Introduction to virology	11/09/2023
Laboratory instruments and safety cabinets	18/09/2023
Collection and transport of virological samples	25/09/2023
Isolation of Bacteriophages from sewage water and its effect on bacteria	02/10/2023
Cultivation of viruses by cell culture technique	9/10/2023
Preparation of primary cell culture (PCC)	16/10/2023
Chick embryo technique	23/10/2023
Harvesting of chick embryo	30/10/2023
Titration of viruses	06/11/2023
Detection of viruses in Blood transfusion technique	13/11/2023
Detection of Swine Influenza virus (H1N1)	20/11/2023
Detection of HPV by PCR technique	27/11/2023
Detection of viruses by ELISA technique	04/12/2023
Examination	11/12/2023
19. Examinations: <u>Some samples of questions</u>	
1. Compositional (Explain), True or false type of exams, Multiple choices, and Fill the blanks	
Q1/ Describe the major human disease caused by:	
Parvo virus -----	
Orthomyxo virus -----	
Rabdo virus -----	
Rota virus -----	
Filo virus -----	
Flavi virus -----	
Epstein-Barr virus -----	
Cytomegalo virus -----	
Pox virus -----	
Togavirus -----	
Q2/Fill in the blanks	
1. Classification of virus according to secondary characteristics include-----	
2. ----- Family replicate in cytoplasm and the majority of these viruses are transmitted to vertebrate by arthropod	

3. Virus bind to receptor molecules on the host cell which are generally-----
----- or -----
4. Helical symmetry includes -----,----- and -----
5. The genome of -----virus consist of 3 circular segments of ssRNA
6. Virus smaller than 50 nm include ----- and -----

Q3/ Describe the ways for uptake of virus to the host cell

Q4/ Describe the general step in replication cycle of Hepatitis B virus

Q/5 Viruses are deemed metabolically dead outside their living hosts due to:

- 1-
- 2-

Q/6 Which of the following things has no a significant role to control viral diseases?

A- Immunizations 2- Insecticides 3- Acaricides 4- Antibiotics 5- Destruction of stray dogs & cats

Q/7 Mention the suspected viral diseases that you have been infected in your life.

Q/8 Choose a correct answer for each of the following statements:

A- Most of human and animal viral diseases and even zoonotic viruses are rampant in the continent of:

- 1- Africa and Asia
- 2- South Latin America
- 3- Asia
- 4- Europe

B- The major antigens which can be directly related to the capsid structure in *Adenoviridae* are:

- 1- Hexon
- 2- Penton
- 3- Fiber Antigen
- 4- All of them

C- Prions cause the following diseases in humans:

- 1- Scrapie
- 2- Creutzfeldt - Jakob disease
- 3- Chronic Wasting disease
- 4- Transmissible Mink Encephalopathy

Q/9 Respond to the following statements with true or false:

(Note: A false answer deletes a true answer)

1- Most of the naked viruses, which accumulate within the cytoplasm or nucleus of the infected cells, release by the lysis of the cell. ()

2- The produced protein by-products from translation of mRNA are used as enzymes to synthesize virus nucleic acid and also these by-products will be a part of the peplomers

structure of new viruses. ()

3- Attached viruses must penetrate the plasma membrane (composed of lipid layer and glycoprotein) of the cell, and the penetration does not depend on viruses (naked or enveloped). ()

4- After uncoating there is an Eclipse period during which no infectious virus particles can be demonstrated even intracellularly. The period continues from uncoating until the first progeny virions are formed inside the infected cell. ()

5- Occurring of latent infections by some viruses due to fusion of their nucleic acids with the cell RNA which leads to the multiplication with each other for consequent generations until finding the suitable environment for separation. ()

Q/10 Write up a question that you have predicted to be within the teacher's questions, but unluckily, your expected question was not brought by the instructor.

Good Luck/Asst.Prof.Dr.Taban Rasheed

Practical Examination

Q/11 Answer the following?

- 1- Why should shell of egg be smooth without cracks during cultivation of viruses?
- 2- Why should Eggs be cleaned but not washed for viral inoculation?
- 3- Why do we use trypan blue in Cell Culture Technique?

Q/12 Fill the following blanks:

- 1- ----- is a buffered medium used to maintain the viability of viruses during their transport to a virology laboratory
- 2- Several specialized techniques have been developed for the cultivation of viruses. These techniques are -----, ----- and ----- .

Good Luck/ Sonia E. Ishaq

20. Extra notes:

We want to be supportive to everyone. This "Course Book" will help you understand how College of Science/Biology Department environment works, what to do first, and who to contact if you need help. We appreciate the participation and sharing from all students related to classroom activities for the first time.

Whenever you have some questions or concerns about virology and the course book, ask any questions you may have about your concern. Sometimes a quick question at time can save a lot of frustration later!

Our discussion goal in the classroom is to be collaborative, not combative. This is important to your success in the course and as a professional. Experience shows that even an innocent remark in the class environment can be easily misconstrued. Please re-think your responses carefully before you react with others in order not to be conceder as

personal attacks. Be positive to others and diplomatic with your words. We will try our best to do the same. Be careful when using sarcasm and humour. Without face-to-face communications your joke may be viewed as criticism. Remember you are not competing with each other for grades, but sharing information and learning from one another. The College of Science, Department of Biology, expects that all students exhibit professional behaviour.

21. Peer review

We have read this course book and we see that it contains the most necessary subjects.....

Asst.Prof.Dr.Kareem Kh. Hamad and Asst.Prof.Dr.Taban K.Rasheed