زانکۆی پۆلیتەکنیکی هەولێر
ERBIL POLYTECHNIC UNIVERSITY

وەزارەتی خوێندنی باڵا و توێژینەوەی زانستی

Course Syllabus

Virology

2022-2023

College	**Health& Medical Technical College- Erbil**	
Department	**Medical Laboratory Techniques**	
Module Name	**Virology**	
Module Code	**VIR702**	
Semester	**7**	
Credit	**6**	
Module type	**Basic**	
Weekly hours		
Weekly hours (Theory)	**(2)hr Class**	**(4)hr Workload**
Weekly hours (Practical)	**(2)hr Class**	**(4)hr Workload**
Lecturer (Theory)	**Sheylan Salah Abdullah**	
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Course Book		
Theoretical Topics	**Week**	**Learning Outcome**
Part 1: General Virology		
Lecture 1 # Introduction to viruses: ➢ History of virus discovery ➢ Structure and morphology of viruses ➢ Reaction to physical and chemical agents ➢ Viral taxonomy and nomenclature	1	- Describe development of virology as a science over time. - Describe basic components of virus particle - Explain the importance of symmetry in virus structures. - Describe basic viral genome structure: Assemble viruses into taxonomic groups based on the Baltimore system
Lecture 2& 3 # Replication of viruses: ➢ Replication of DNA and RNA viruses ➢ Bacteriophages: viruses that infect only bacteria	2-3	- Predict the tissue tropism of viruses based on the receptor on the host cell Contrast different trigger mechanism and their connection to entry mechanism. And describe three general mechanisms of viral entry - Explain different replication strategies for positive and negative stand of DNA and RNA viruses. - Compare these replication strategies with genome replication strategy of host cells. - Describe replication strategies for Understand basic steps in virus assembly - Understand differences between enveloped and non-enveloped viruses - Explain the structure, abundance, and life cycles of bacteriophages and differences between lytic and lysogenic cycle and phage therapy.
Lecture 4 # Viral Heredity &Variation: ➢ Genetics of viruses ➢ Mechanisms of viral gene mutation ➢ Defective interfering particle, defective virus ➢ Classification of viruses	4	- Gene Regulation and Recombinant

Lecture 5# Mechanisms of Viral Pathogenesis: ➢ Viral infection and transmission (viral horizontal transmission and vertical transmission) ➢ Mechanism of viral pathogenesis: cytopathic effect. ➢ Human Immune Response to viral Infections & Control of viral diseases (immune pathogenesis and immune escape) ➢ Forms of viral infection, viral persistent infection the characteristics of chronic virus infection and latent virus infection	5	- Understand importance of infection patterns on public health. - Describe basic course of infection, Predict influence of infection pattern on disease prevention - Distinguish steps in viral pathogenesis - Understand differences between acute and chronic viruses - Understand interplay between viral life cycle and host defenses - Understand immune evasion strategies of differences between viruses - Predict level of immune modulation based on viral replication strategies - Design potential immune evasion strategy for viruses.
Lecture 6 # Antiviral Agents and Gene Therapy: ➢ Antiviral, Vaccines and Chemotherapy ➢ Virus Vectors and Gene Therapy	6	- Evaluate the potential of entry inhibitor antivirals. - Understand different control measures available to human medicine. - Understand the importance of vaccination for individual as well as public health. - Describe different control measures including vaccination, quarantine. - Evaluate the risks and benefits of vaccination on a personal as well population level.

Part 2: Patterns of infections:		
Lecture 7 # Orthomyxovirus: ➢ The main biological characteristics of Orthomyxovirus ➢ Influenza virus infections in human ➢ Evolution of influenza virus and flu pandemics	7	- Understand the History, clinical features, epidemiology of influenza, RSV and other respiratory viruses (Human parainfluenza, Human Rhinovirus). - Biology of Novel respiratory viruses (SARS, MERS CoV, SARS-CoV-2, H7N9, COVID-19). - Vaccines against different viral respiratory diseases. - Understand factors leading to virus emergence and new viruses Appreciate the role of viral emergence on human affairs - Describe reasons for viral emergence Predict the potential for virus evolution and emergence.
Lecture 8 # Paramyxovirus: The main biological characteristics of Paramyxovirus ➢ Parainfluenza virus infection ➢ Respiratory Syncytial virus infections ➢ Measles virus infections ➢ Mumps virus infections ➢ Other viruses causing respiratory infections： Rubella (Congenital viral infections), adenovirus、rhinovirus, coronavirus, etc. ➢ Parvovirus and infection (Parvovirus B19) Poxviruses.	8	- Viruses associated with Exanthemata's Diseases: Epidemiology, Clinical features, disease burden, case definition and associated risk factor, strategies for prevention &treatment, biology and immunopathogenesis. - Biology of Measles, mumps, rubella, Parvovirus B-19, Chicken pox and other viral pox diseases. - Clinical complications of measles and rubella. - Common features of viral pox diseases and case definitions. Para specific immunity due to pox vaccination, eradication and control programs.
Theoretical Midterm Exam		

Lecture 9 # Rabies virus: ➢ Rabies virus infection ➢ Epidemiology (prevalence, causative agent, source, reservoir, routes of transmission, risk factors, infectious material). Symptomatology ➢ The principles of prevention and treatment of rabies. ➢ Prion and slow viral infections.	9	- Basic knowledge of Role of non- human host and vectors in natural transmission of virus infections - Overview of sporadic viral encephalitis rabies virus: clinical diagnosis and case management
Lecture 10 # Hepatitis virus: **The enteric hepatitis viruses A and E** **Hepatitis virus A** ➢ Properties of Hepatitis A virus (genome) ➢ Hepatitis A virus infections ➢ Prevention & control of hepatitis A infection. **Hepatitis virus E** ➢ The main properties of Hepatitis E virus ➢ Hepatitis E virus infection ➢ Prevention & control of hepatitis E infections.	10	- Physiology of Jaundice, clinical features and differential diagnosis, presentations of hepatitis caused by different hepatitis viruses, epidemiology of hepatitis viruses. - Structure & genomic organization, replication, genotypes, serotypes of HAV, HBV, HCV & HEV. Mutations in hepatitis viruses. - Immunopathogenesis of different hepatitis viruses. - Historical aspects, types of hepatitis vaccines, vaccines presently used & vaccines of the future, antivirals against HBV and HCV.
Lecture 11 # The bloodborne hepatitis B, C and D viruses: **Hepatitis B virus** ➢ The main biological characteristics of Hepatitis B virus (genome, replication) ➢ Profiles of Hepatitis B virus infection （chronic infection） ➢ Treatment, prevention & control of hepatitis B infection **Hepatitis D virus:** ➢ Properties of Hepatitis D virus ➢ Hepatitis D virus infection and control **Hepatitis virus C** ➢ The main properties of Hepatitis C virus (genome), chronic infection, treatment, prevention and control.	11	

Lecture 12 # Retrovirus (Reverse Transcribing viruses) **Human Immunodeficiency virus (**Sexually transmitted viral infections) **(**Congenital viral infections) ➢ Major biological properties of HIV: including morphology and structure , genome and replication cycle ➢ HIV Pathogenic mechanism and Immunological function ➢ HIV prevention and treatment	12	- Epidemiology of HIV infection & transmission of HIV among adults and children; Sexually transmitted diseases and their relation with HIV; Newer Methods of HIV Prevention; Social and behavioural aspects of prevention. - Pathogenesis: Life cycle of HIV: structure and replication; HIV characterization including HIV isolation; Immunopathogenesis of HIV infection - Clinical Manifestation: Natural history, Clinical spectrum of HIV infection and complications in HIV: infectious, (bacterial, Fungal, viral), tumors, CNS involvement and Opportunistic infections. - Anti-retroviral treatment: Classes of ARV drugs and treatment schedules, newer developments; ART drug resistance, complications and drug resistance monitoring and assessment - Ongoing and Past cutting edge HIV Research: HIV vaccine and Clinical trials of drugs and vaccines.
Lecture 13 # Gastrointestinal Virus: ➢ General properties and overview of Picornaviruses(enteroviruses) ➢ Properties of polioviruses, Pathogenicity and immunity of polioviruses **Acute gastroenteritis-associated Viruses:** ➢ General properties of rotaviruses, Pathogenicity and immunity of rotaviruses ➢ Caliciviruses infections (Noroviruse) ➢ Enteric adenoviruses and reovirus infection	13	- Classification of enteric viruses, epidemiological scenario with respect to Viral Enteric Diseases. - Clinical course, disease burden, risk factors, prevention, and treatment. - Rotavirus diversity, emerging strains, immune responses and immunopathogenesis of major viral agents associated with acute gastroenteritis. - Other Enteric viruses associated with acute gastroenteritis: Adenoviruse and Noro viruses. vaccines and control - Enterovirus diseases of public health concern (non-polio and Polioviruses.

Lecture 14& 15 # Human Herpesvirus and oncogenic viruses **Herpesviruses** ➢ The properties of Herpesviruses (Herpes simplex viruses) and infections (latent infection) (Sexually transmitted viral infections) ➢ Varicella-Zoster virus and infections (latent infection) (Congenital viral infections) ➢ Cytomegalovirus and infections (Sexually transmitted viral infections) (congenital infection) **Oncogenic viruses** ➢ General Features of viral carcinogenesis ➢ Epstein-Barr virus ➢ Kaposi's sarcoma-associated herpesvirus ➢ Human T-cell lymphotropic virus (HTLV-1) ➢ Other human herpesvirus infection Papillomavirus and infections (Sexually transmitted viral infections)	14-15	- Understand basic mechanism of oncogenes and viral transformation
Student Presentations	16	

Assessment scheme:

Assessment task (e.g., essay, test, group project, examination, etc.) Your grade will be based on the following:

Year Works	Details	Work load	Degree	Total
Midterm Examinations	Theoretical	1	10	**60%**
	Practical	1	15	
Activities	Homework	2	5	
	Seminar	1	10	
	Report	1	10	10
	Essay	1	10	
	Quiz	2	8	
	Class Activity (Attendance)	1	2	
	Lab Report	1	10	
Final Examinations	Theoretical		20	**40%**
	Practical		20	
Total			**100**	**100%**

Course Reading List and References:

- Collier, L., Kellam, P., and Oxford J. (2011). Human Virology. Fourth Edition. Oxford University Press, U.K.
- Principles of Virology" Flint S.J., Enquist L.W., Racaniello V.R., Skalka A.M. 2008, 3rd edition, ASM Press.
- "Basic Virology" Edward K. Wagner, Martínez J. Hewlett, David C. Bloom, David Camerini. 2007, 3rd edition, Wiley-Blackwell. "Introduction to Modern Virology" N.J. Dimmock, A.J. Easton, K.N. Leppard. 2007, 6th edition, Wiley-Blackwell.
- "Janeway's Immunobiology" K. Murphy, P. Travers, M. Walport. 2011, 8th edition, Garland Science.
- "Understanding viruses" Teri Shors. 2nd ed. Burlington: Jones & Bartlett Learning, cop. 2013.