Title of the Course: MEDICAL VIROLOGY [T]

Course Code: MIC-609
Number of Credits: 3, Theory
Contact hours: 45
Effective from Academic Year: 2022-2023

Prerequisites	The student should have a basic understanding of viruses.	
Objective:	• Develops concepts in structure, classification, cultivation, assay, pathogenesis and treatment of disease-causing viruses.	
Content:		
1.	**Viral Diversity and the Study of Viruses**	**(15)**
1.1	**Viruses**	**7**
	Structure, genomic diversity, classification according to Baltimore's system and the ICTV	
	Viral replication and interference	
1.2	**Methods to study and detect viruses**	**8**
	Ultrastructure visualization by electron microscopy	
	Cultivation *in vitro*, *in ovo* and *in vivo*	
	Monitoring of clinical manifestations of *in vivo* viral inoculation: fever, neurological symptoms, pruritis	
	Detection by cytological and histological techniques: plaque, pock, polykaryocytes, hemadsorption, cytopathogenicity, tumor formation.	
	Detection by quantitative and serological techniques: hemagglutination assay, virus neutralization, ELISA, immunofluorescence, immunohistochemistry	
	Detection by nucleic acid-based techniques: PCR, RT-PCR, nucleic acid hybridization, high-throughput sequencing	
2.	**Viral Diseases**	**(15)**
	Viral agents of disease: structure, mode of replication, symptoms, pathogenesis and diagnosis Family Picornaviridae: Polio virus Family Herpesviridae: Herpes simplex virus Family Coronaviridae: SARS-CoV-2 Family Hepadnaviridae: Hepatitis B virus Family Orthomyxoviridae: Influenza A virus Family Retroviridae: HIV	
3.	**Oncogenic and Emerging Viruses and Antiviral Combat**	**(15)**
3.1	Oncogenic viruses: Family Papovaviridae – Human papillomavirus 16 and 18, cervical cancer development Role of viral oncogenes in causing cancer, retroviral oncogenes such as growth factors, transcription regulators and kinases	**5**

	Role of the Human Genome Project in identification of viral oncogenes	
3.2	Emerging viral agents of disease, such as Ebola, Nipah and Zika viruses	**2**
3.3	Virus-host interactions: Host specific and nonspecific defense mechanisms; neutralizing antibodies; the role of interferon.	**4**
3.4	Viral vaccine development: Traditional vaccine preparations and modern molecular approaches (adenoviral vector-based vaccines, mRNA vaccines), vaccines against oncoviruses. Antiviral drugs: nucleoside analogs, entry inhibitors, viral enzyme inhibitors, immunotherapy, combination therapy	**4**
Pedagogy:	Lectures/tutorials/assignments	
References/ Readings	Cohen, A., *Medical Virology*, John Wiley & Sons, Incorporated (1975).	
	Davis, B.D., Dulbecco, R., Eisen, H.N. and Ginsberg, H.S., *Microbiology*, Harper and Row Publishers (1982).	
	De La Maza, L.M., Peterson, E.M., *Medical Virology*, Springer Science & Business Media (2013).	
	Dimmock, N.J., Easton, A.L. Leppard, K.N., *Introduction to Modern Virology*, Blackwell Publishing Ltd (2023).	
	Evans, B., *Perspectives in Medical Virology*, Volume 1, Elsevier (2007).	
	Flint, S. J., Racaniello, V. R., Rall, G. F., Hatziioannou, T., & Skalka, A. M., *Principles of Virology*, John Wiley & Sons (2020).	
	Harper, D.R., *Viruses: Biology, Applications, Control*, Garland Science (2011).	
	Payne, S., *Viruses: From Understanding to Investigation*, Elsevier (2022).	
	Ryu, W., *Molecular Virology of Human Pathogenic Viruses*, Elsevier (2016).	
	White, D.O., Fenner, F., *Medical Virology*, Gulf Professional Publishing (2016).	
	https://www.cdc.gov/ncird/dvd.html	
	https://www.who.int/southeastasia	
	https://viralzone.expasy.org	
Course Outcomes	• To explain morphology, mode of infection and multiplication of medically important viruses and their treatment. • To apply traditional and modern techniques for the study and detection of viruses • To analyze the roles of viral pathogen and host in the development of disease • To devise strategies to combat emerging viral pathogens.	