

Course Book

Course Description	<p>Advanced virology for Ph D students is a course designed to provide an in-depth understanding of the nature of viruses and the significance of viruses in the molecular and clinical point of view. Viruses are the most numerous and the most ubiquitous particles that are completely inactive outside the host but extremely replicating agents inside host cells. This course will include two basic sectors; studying virus structure, classification and replication strategies including all the 7 classes of viruses and describing the pathological role of viruses in human infections including complex interactions between viruses and hosts, outcomes of virus infections, epidemiology, oncogenic properties and antiviral agents and resistance to antiviral drugs. Main groups of viruses will be also studied in-depth such as respiratory viruses, enteroviruses, herpesviruses, etc. to specifically highlight disease pathogenesis of different groups of viruses.</p>
Course Objectives	<ol style="list-style-type: none">1. To understand the nature of viruses, including their structure, replication and classification.2. To explore how infection and replication of viruses is constrained by the viral genome and host immune defenses.3. To learn how transmission strategies, immune evasion and host responses contribute to viral pathogenesis4. To understand the outcomes of any viral infection5. To study therapeutic antiviral strategies and antiviral resistant mechanisms.6. To highlight a number of viral families that extremely related to important diseases including oncogenic viruses.

Evaluation	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	
	Paper Review	15			
	Assignments	Homework			
		Class Activity			
		Report			
		Seminar	10		
		Essay			
		Project			
	Quiz	5			
	Lab.				
	Midterm Exam	20			
	Final Exam	50			
	Total	100			
Specific learning outcomes	<ol style="list-style-type: none"> 1. Explaining the traditional criteria used to classify viruses into families and genera, virion components and their role in disease pathogenesis. 2. Outlining a generalized scheme of virus replication involving seven steps; describe how animal viruses attach to and enter their host cells differentiating between the entry mechanisms of naked and enveloped animal viruses. 3. Explaining how virus genes are transcribed and translated including post-translational modifications that some virus proteins undergo and the transport of virus proteins and RNA within host cell. 4. Stating the locations within eukaryotic cells where different categories of virus genome are replicated; the role of primers in virus nucleic acid synthesis, roles of virus and host proteins in virus genome replication, replication mechanisms of different virus classes (Class I-VII). transcription 5. Describing the assembly mechanisms for nucleocapsids with helical and icosahedral symmetry discuss, the origins of internal virion membranes and of virion envelopes, the roles played by membrane/matrix proteins in the budding of some enveloped viruses and mechanisms used by viruses to exit from cells. 6. Describing the major components of innate and adaptive immunity in vertebrates, outline the process of RNA silencing and programmed cell death, explain important terms such as productive infection, non-productive infections (latent, abortive, defective virus infections). 				

	<p>7. Outlining in depth viral pathogenesis including complex interactions between viruses and hosts comprising of transmission, replication, dissemination, immune response, and pathology to produce disease in humans.</p> <p>8. Describing the modes of action of selected anti-viral drugs and possible mechanism of resistance to some of these drugs in addition to evaluate anti-viral drugs in clinical use.</p> <p>9. Explaining Human respiratory viruses including Influenza virus A, B and C, Parainfluenza virus, RZV, Human metapneumonia virus, Adeno virus and BKV highlighting their pathogenic cycle.</p> <p>10. Describing Human enteroviruses including Poliovirus, Coxsackievirus, Echovirus and other enteroviruses highlighting their pathogenic cycle.</p> <p>11. Listing the human herpesviruses (the largest family of dsDNA viruses) and explain their importance; the phenomenon of herpesvirus persistence and its importance. Highlighting the pathogenic cycle of each of HSV1 and 2, VZV, EBV and CMV.</p>
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Course References:	<p>1. John Carter & Venetia Saunders (2007). Virology – Principles and Applications. 1st Ed., John Wiley.</p> <p>2. Kenneth J. Ryan, editor. (2018). Sherris medical microbiology: an introduction to infectious diseases. 7th Ed. Norwalk, Conn.: Appleton & Lange.</p>
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Course topics	Week	
Virus structure and classification	1	
Virus Replication (attachment, penetration and transcription)	2	
Virus replication (translation and genome replication)replication	3	
Virus replication (assembly and release)	4	
Outcomes of viral infection	5	
Virus pathogenesis I	6	
Virus pathogenesis II	7	
Antiviral agents and resistance	8	

Respiratory Viruses	9	
Enteroviruses	10	
HSV 1 and 2, VZV	11	
EBV and CMV	12	
Questions Example Design 1. <i>MCQ</i> 2. <i>Essay</i> 3. <i>Short Answers</i>		
Extra notes:		
External Evaluator		