

DISCIPLINE SHEET

Name of the discipline: Virology

Course holder: Prof. Simona Maria Ruta

Year of study: 2023-2024

Number of hours per week/Verification/Credits		
Course	Form of examination	Credits
2	Examination	15

A. DISCIPLINE OBJECTIVES (Objectives are formulated in terms of professional competences):

The general objective of the discipline	Acquiring general, theoretical and practical knowledge regarding the mechanisms involved in the pathogenesis of human viral infections and the principles of prophylaxis and treatment
Specific objectives:	<ul style="list-style-type: none"> - Description of fundamental concepts and notions related to viral structure and replication - Understanding the pathogenic mechanisms of viral infections - Description of the mechanisms of action of antiviral drugs and therapeutic strategies used in viral infections - Types of viral vaccines, advantages and disadvantages for each platform - Viral diagnosis - algorithm for monitoring the natural and under-treatment evolution of viral diseases

B. CONDITIONS (where applicable)

	Serology, cell cultures and molecular biology laboratories, amphitheater/lecture hall with multimedia projector, video projector, laptop
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C. ACCUMULATED SPECIFIC COMPETENCES (Refers to the competences provided by the study program to which the subject belongs)

Professional skills	<ul style="list-style-type: none"> - Conceiving and applying an algorithm for diagnosis and virological monitoring - Understanding the mechanisms involved in the pathogenesis of viral infections - Ability to elaborate scientific papers and experimental reports - Ability to critically interpret research results - Ability to understand and evaluate quickly and correctly new information,
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	<ul style="list-style-type: none"> - Ability to identify alternative solutions and evaluate their relevance
Transversal competences	<ul style="list-style-type: none"> - - Identification of roles and responsibilities in a multidisciplinary team and implementation of effective cooperation techniques within the team - Establishing a good and effective communication relationship between doctor and patient/doctor-family members regarding viral diagnosis and prevention of viral infections. - Efficient use of information sources and resources for communication and assisted professional training (internet portals, specialized software applications, databases, on-line courses, etc.) both in Romanian and in a language of international circulation - -Adaptation to new technologies, professional and personal development - Respecting and developing professional values and ethics

D. CONTENT OF THE DISCIPLINE

a) Course

Chapter	Content	Nr. hours
1. Viral structure and replication	Viral structure. Viral life cycle. Replicative strategies: Baltimore classification. Viral families of medical interest.	2
2. Viral immunity	Viral immunity: Innate and acquired immunity. Interferons: mechanisms of action and biological effects. NK cells. Humoral and cellular immune response in viral infections. The role of MHC in the presentation of viral antigens. Immune evasion. Pathogenesis of viral infection	2
3. Viral vaccines	Viral vaccines: Inactivated vaccines, live attenuated vaccines. modern platforms: viral vectors, mRNA vaccines. Advantages and disadvantages.	2
4. Orthomyxoviruses	Influenza viruses; Structure and replication. Variability: antigenic drift and shift. Viral diagnosis in influenza. Influenza vaccines. Antivirals against influenza viruses.	2
5. Paramyxoviruses	Respiratory Syncytial Virus (RSV). Measles virus. Mumps virus. - structural and pathogenic features. Viral life cycle. Viral diagnosis. MMR vaccine. Prophylaxis against RSV: Monoclonal antibodies. New RSV vaccines. Emerging neurotropic paramyxoviruses: Nipah and Hendraviruses	2
6. Herpesviridae	Herpes simplex viruses (HSV 1 and 2). VZV, EBV, CMV; Human herpes viruses 6, 7 and 8. Viral replicative cycle.	2

	Mechanisms involved in latency. Viral diagnosis. Antivirals against herpesviruses. Prophylaxis	
7. Neuroviroses	Neurotropic viruses. Ethiology of viral meningitis, meningoencephalitis and encephalitis. Enteroviruses. Polio. Coxsackie. ECHO viruses. New neurotropic enteroviruses. Neurotropic arboviruses (West Nile, Zika, Denga, Chikungunya, TBE, Crimea Congo viruses). Rabies. Viral diagnostic. Prophylactic methods. Rabies vaccines	2
8. HIV/AIDS	Retroviridae: onco and lentiviruses. HIV- viral structure. Replication. Pathogenesis. Viral diagnosis. Virological monitoring of HIV/AIDS. Antiretrovirals-mechanism of action. Therapeutic strategies. Pre and post exposure prophylaxis.	4
9. Hepatitis viruses	Hepatitis A, B, C, Delta, E viruses. Viral structure and replication. Chronic hepatitis B and C. The main mechanisms involved in chronicization. Viral diagnosis. Antivirals used in the treatment of chronic hepatitis B. Antivirals used in the treatment of chronic hepatitis C. Prophylactic methods.	4
10. Human papillomaviruses	Lithic versus persistent infection. High risk genotypes. Mechanisms involved in oncogenesis. Viral diagnosis. HPV vaccines.	2
11. Viruses and cancers	Oncogenes and anti-oncogenes. Oncogenesis with DNA viruses (gama herpesviruses, papovaviruses, hepadnaviruses). Oncogenesis with RNA viruses (HTLV)	2
12. Emerging viruses	Highly pathogenic coronaviruses: SARS-CoV, MERS-CoV, SARS-CoV2. Structure and replication. SARS CoV-2 vaccines. Antiviral drugs. Viral hemorrhagic fevers. Ebola and Marburg viruses. Pathogenesis. Ebola vaccines. Other pandemic threats- preparation and early response. Diagnostic algorithm for epidemics with emerging viruses	4
Total hours		30

E. EVALUATION (Specify the methods, forms of evaluation and their weighting in determining the final grade. Indicate the minimum performance standards, related to the competences defined in point

A. Objectives of the discipline)

Activity Type	Assessment criteria	Evaluation methods	Weighting of the final grade
Course	Accuracy and quality of responses during examination	-Written examination and presentations of	

		clinical cases - virological diagnosis and treatment monitoring	
The results are expressed by the following ratings: " <i>Very good</i> "; " <i>Good</i> "; " <i>Satisfactory</i> "; " <i>Unsatisfactory</i> ." The ratings " <i>Very good</i> ", " <i>Good</i> " and " <i>Satisfactory</i> " allow the PhD student to obtain the credits.			

F. METHODOLOGICAL BENCHMARKS

Lecture combined with dialogue. Use of modern means of training. Course support.

G. Corroborating the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and employers representative in the field related to the program

- The discipline provides fundamental and practical knowledge on pathogenesis and modern methods of diagnosis, treatment and prophylaxis for viral infections.
- The discipline offers basic elements that help the PhD student to conduct the experimental part

H. SELECTIVE BIBLIOGRAPHY

1. Knipe DM, Howley PM (*editors in chief*)-Fields Virology, 7th edition, DNA Viruses 2021, RNA viruses 2022, Emerging Viruses 2022, Wolters Kluwer Publishing House | Lippincott Williams Wilkins.
2. Cernescu C, Virusologie medicala - Editura Medicala , 2012
2. Cernescu C, Ruta S, Practica diagnosticului virologic, Editura Concept publishing, 1997
3. Ruta S, Cernescu C, Progrese în control and prevention virozelor cu potential bioterorist Editura Universitara "Carol Davila", 2004
4. Ceausu E (*sub redactia*), Tratat de boli infectioase Editura Medicala vol I 2018, vol II 2020

Course holder

Prof.dr. Simona Maria Ruta



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