

1. Module identification code	
Name of the institution	Universidad Autónoma de Nuevo León
Name of the school	School of Medicine
Name of the degree program	Clinical Chemistry
Name of the course (learning unit)	Micology and Virology
Total number of class hours-theory and practice	80 h
Class hours per week	4 h
Independent study	40 h
Course modality	Face-to-face instruction
Module level	Sixth semester
Core/elective module	Core
Curriculum area	ACFP-F
UANL credit points	3
Create date	04/06/2018
Date of last amendment made	25/11/2020
Person(s) responsible for the design and amendment of the module	Design: Gloria M. González González, PhD, Mariana Elizondo Zertuche, PhD Amendment: Alexandra M. Montoya Mendoza, PhD, Rogelio de J. Treviño Rangel, PhD
2. Presentation	
<p>The academic unit Mycology and Virology includes 3 phases. Phase 1 consists of an introduction to general and medical mycology, where we analyze the morphology and function of fungi and their relationship to the environment. We perform laboratory tests for the identification of fungi and the interpretation of these results, as well as elaborating a report with the etiological diagnosis. In phase 2, that includes general and medical virology, we analyze the morphology and function of viruses and their relationship with the environment, doing laboratory tests for their identification and interpretation of results, as well as the elaboration of a report with the differential diagnosis of each of the diseases that these infectious agents may produce. Phase 3 includes antifungal and antiviral therapy, where we analyze the general characteristics of the molecules, their chemical composition and mechanism of action for the performance of phenotypic susceptibility tests and resistance genotypes. Finally, the learning process will conclude with the PIA, which is a proposal for the resolution of theoretical and practical clinical scenarios for the analysis of the pathogenic agents in clinical samples, where the student will have to select the appropriate laboratory tests for the identification and interpretation of results.</p>	
3. Purpose	

The academic unit Mycology and Virology contributes to the graduate profile by developing necessary skills for the selection and performance of laboratory tests that allow for the identification of fungi and viruses in clinical samples, through the analysis of their properties, relation to clinical manifestations, and the elaboration of a laboratory report, focusing on the prevention, diagnosis and treatment of these diseases.

Regarding general skills, the student will be able to apply various strategies for the study of fungi and viruses. The student will manifest human, academic and professional commitment for the contribution to the patient's wellbeing and respect to the environment during their daily work in the laboratory. The student will conduct themselves with empathy during team work conflicts that may arise, such as laboratory sessions, seminars, and lectures.

In the unit Mycology and Virology, the student will acquire specific skills that may allow them to obtain, manage, store and analyze samples for the clinical diagnosis of fungal and viral diseases. Likewise, they will follow in a responsible manner and according the national and international norms all the chemical and biological material for the protection of health and the environment. They will interpret the results that will allow for timely decision making in the diagnosis of these disease.

The unit Mycology and Virology integrates the previously acquired skills in the following units: Basic Microbiology, where they study and analyze the microbial world and their cellular diversity; Immunology, where they identify the elements involved in the immune response, like the production of antibodies, lymphocyte activation and cytokine production for the prevention, diagnosis and treatment of diseases; Biochemistry and Molecular Biology, that allows the understanding of the chemical components of living organisms, especially proteins, carbohydrates, lipids and nucleic acids, and other small molecules present inside the cells, as well as the structural and biochemical disorders that may lead to a disease and their diagnosis. This unit provides some fundamental bases for Diagnostic Medical Microbiology.

4. Competences of the graduate profile

a. General competences to which this module (learning unit) contributes

Instrumental skills

1. To apply autonomous learning strategies at different levels and field of knowledge that allow them to make timely and relevant decisions in the personal, academic and professional spheres.

Personal and social interaction skills

10. To intervene in the face of the challenges of contemporary society at the local and global level with a critical attitude and human, academic and professional commitment to contribute to consolidating general well-being and sustainable development.

Integrative skills

14. To resolve personal and social conflicts, in accordance with specific techniques in the academic field and in their profession or for appropriate decision-making.

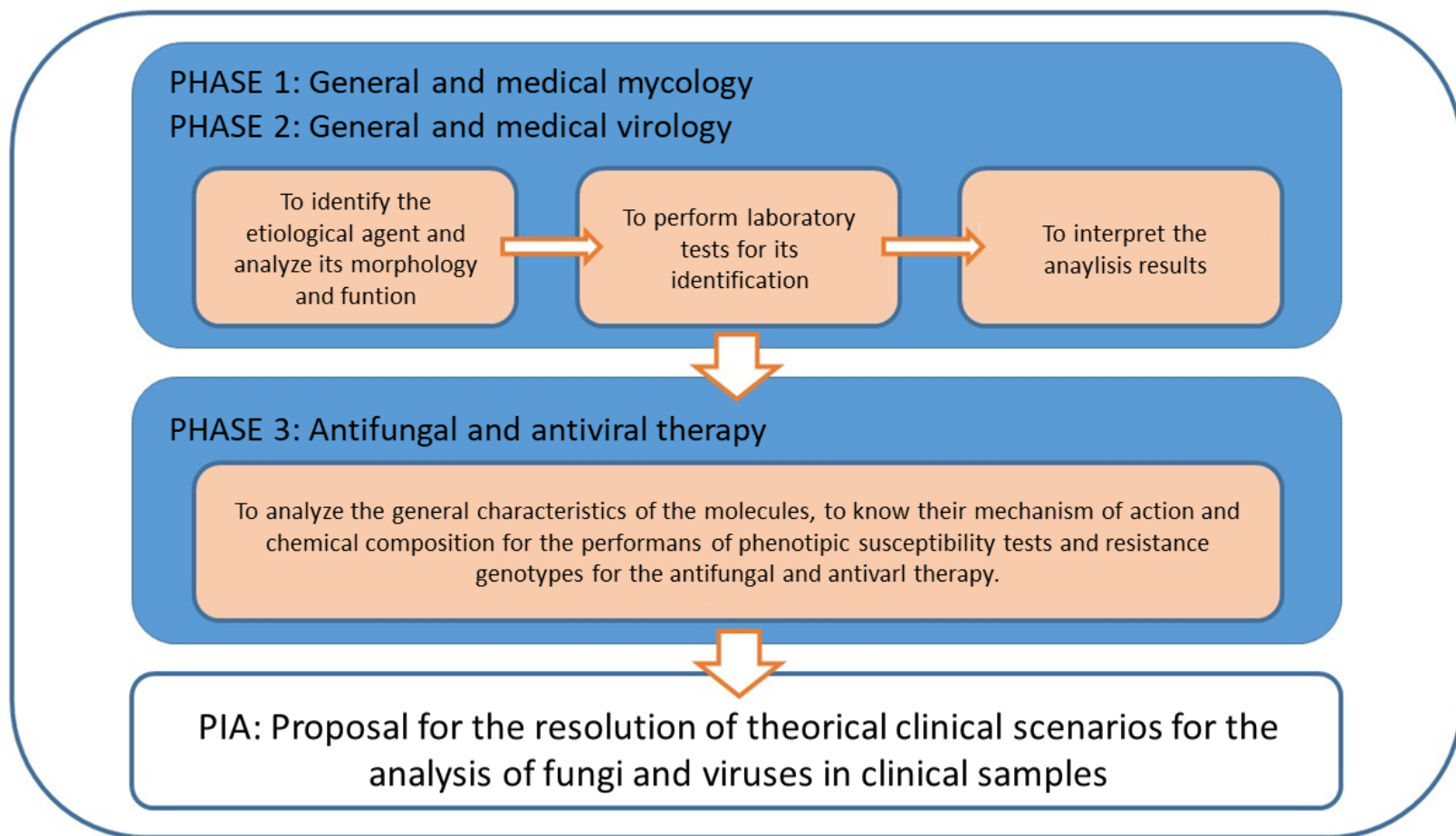
b. Specific competences of the graduate profile to which this module (learning unit) contributes

2. To execute physical, chemical and/or biological procedures in collection, handling, storage and analysis of samples to contribute to a reliable clinical, toxicological, chemical, food, forensic and environmental diagnosis.

3. To handle chemical and biological materials following official Mexican and/or international standards that guarantee their correct use and disposal to preserve health and the environment.

6. To interpret the results of analyses based on established criteria that allow timely and pertinent decision-making in clinical, toxicological, chemical, food, forensic and environmental diagnosis.

5. Course roadmap



6. Structuring into stages or phases

Phase 1: General and Medical Mycology

Component(s) of the competence: To perform the laboratory tests for the identification of fungi, considering their morphology function and environment, to obtain an accurate etiological diagnosis.				
Evidence of student learning	Performance criteria	Learning activities	Content	Resources
1. First theoretical-practical written evaluation	Evaluation criteria <ul style="list-style-type: none"> Individual and online exam submission through Exemplify, covering the topics for Phase 1 	<ul style="list-style-type: none"> The students study individually and autonomously the contents before each class session (see Class Bibliography) The professor explains the most relevant concepts included in the Curriculum section The students and professor discuss in class the concepts included in the Curriculum section, using images and infographics The students consult, individually or collaboratively and throughout Phase 1, the image depository "Mycology Image Gallery" (see Free Use Resources) The students perform, individually or collaboratively, practical exercises on mycology basic procedures (Graded 	<ul style="list-style-type: none"> Classification of the mycoses according to their location Main diseases of clinical importance produced by fungi and their etiological agents Laboratory tests: direct, culture, serological and molecular tests used for the identification of fungi, supporting their use for an accurate diagnosis Topics for evaluation: <ul style="list-style-type: none"> Introduction General mycology Dermatofitosis or tinea: <i>Trichophyton</i> spp., <i>Microsporum</i> spp., <i>Epidermophyton</i> spp. Pitiriasis versicolor: <i>Malassezia furfur</i> Tinea nigra: <i>Hortaea werneckii</i> (<i>Exophiala werneckii</i>) Black piedra; <i>Piedraia hortae</i> White piedra and trichosporonosis: <i>Trichosporon asahii</i>, <i>T. inkin</i>, <i>T. mucoides</i>, etc. 	<ul style="list-style-type: none"> Moodle MS Teams Internet connection Laboratory Computer Projector Whiteboard Projector screen Microscope Various materials Class bibliography Laboratory book Social media Image depository "Mycology Image Gallery" (Free Use Resources)

		<p>Activity 1.1. Grading document 1)</p> <ul style="list-style-type: none"> • The students perform, individually or collaboratively, exercises related to the diagnosis of superficial and subcutaneous mycosis and the identification of the most frequent etiological agents (Graded Activity 1.2. Grading document 1) • The students perform, individually or collaboratively, exercises related to the diagnosis of systemic and opportunistic mycoses and the identification of the most frequent etiological agents (Graded Activity 1.3. Grading document 1) • The student performs individually the laboratory reports for the Graded Activities 1.1, 1.2 and 1.3 in their Laboratory Book (Graded Activity 2.1. Grading document 2) 	<ul style="list-style-type: none"> ○ Esporotricosis: <i>Sporothrix schenckii</i>, <i>S. globosa</i>, etc. ○ Cromoblastomycosis: <i>Fonsecaea pedrosoi</i>, <i>F. compacta</i>, <i>C. carrionii</i>, <i>Phialophora errucosa</i>, <i>Wangiella dermatitidis</i>, etc. ○ Mycetoma eumicótico: <i>Madurella mycetomatis</i>, <i>M. grisea</i>, <i>P. boydii</i>, etc. ○ Blastomycosis: <i>Blastomyces dermatitidis</i> ○ Paracoccidioidomycosis: <i>Paracoccidioides brasiliensis</i> ○ Coccidioidomycosis: <i>Coccidioides immitis</i>, <i>C. posadasii</i> ○ Histoplasmosis: <i>Histoplasma capsulatum</i> ○ Candidosis: <i>Candida albicans</i> y <i>C. no-albicans</i> ○ Criptococosis: <i>Cryptococcus neoformans</i> ○ Aspergillosis: <i>A. fumigatus</i>, <i>A. niger</i>, <i>A. flavus</i>, <i>A. terreus</i>, etc. ○ Cigomycosis: <i>Rhizopus oryzae</i>, <i>R. arrhizus</i>, <i>racemosus</i>, <i>M</i> 	
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			<i>circinelloides, R. pusillus, A. corymbifera</i>	
Phase 2: General and Medical Virology				
Component(s) of the competence: To analyze the morphology, function and environment in which virus develop, and select the laboratory tests to perform an accurate diagnosis.				
Evidence of student learning	Performance criteria	Learning activities	Content	Resources
2. Second theoretical-practical written evaluation	Evaluation criteria <ul style="list-style-type: none"> Individual and online exam submission through Exemplify, covering the topics for Phase 2 	<ul style="list-style-type: none"> The students study individually and autonomously the contents before each class session (see Class Bibliography) The students and professor discuss in class the concepts included in the Curriculum section, using images and infographics The students consult, individually or collaboratively and throughout Phase 2, the pertinent information about vaccines in the depository "Vaccines 2019" (see Free Use Resources) The students perform, individually or collaboratively, 	<ul style="list-style-type: none"> Diseases caused by viruses and their etiological agents Classification of viruses according their molecular structure and mechanism of action Topics for evaluation: <ul style="list-style-type: none"> Introduction General virology Virus causing warts, papyloma, condyloma and cancer condiloma y cancer Rabies virus Rubella virus Herpes simplex virus Varicella-zoster virus Infectious mononucleosis virus Citomegalovirus Adenovirus Influenza virus Parainfluenza virus Respiratory syncytial virus Rhinovirus 	<ul style="list-style-type: none"> Moodle MS Teams Internet conection Laboratory Computer Projector Whiteboard Projector screen Microscope Various materials Class bibliography Laboratory book Social media Depository "Vaccines 2019" (Free Use Resources)

		<p>practical exercises on the diagnosis of viral diseases (Graded Activity 1.4. Grading document 1)</p> <ul style="list-style-type: none"> The student performs individually the laboratory reports for the Graded Activity 1.4 in their Laboratory Book (Graded Activity 2.2. Grading document 2) 	<ul style="list-style-type: none"> Mumps virus Measles virus Rotavirus and Norwalk virus Human immunodeficiency virus Dengue virus Hepatitis A, B, C, D and E virus 	
<p>Phase 3: Antifungal and antiviral therapy</p> <p>Component(s) of the competence: To analyze the general characteristics of antifungals and antivirals to understand their mechanism of action and chemical composition to perform phenotypic and genetic susceptibility tests for treatment.</p>				
Evidence of student learning	Performance criteria	Learning activities	Content	Resources
3. Antifungals and antivirals diagram	<p>Content criteria:</p> <ul style="list-style-type: none"> Draws a diagram of the fungal cell and animal cell with the viral replication cycle Includes all indicated antimicrobials Identifies the pharmacological target for each antimicrobial in the corresponding diagram Describes the mechanism of action of antimicrobials 	<ul style="list-style-type: none"> The students study individually and autonomously the contents before each class session (see Class Bibliography) The students and professor discuss in class the concepts included in the Curriculum section, using images and infographics The students solve collaboratively theoretical problems 	<ul style="list-style-type: none"> Structure, function and applications of the main antifungals and antivirals of clinical use The antifungals: <ul style="list-style-type: none"> Information of the following classes of antibiotics (azoles, equinocandins and polienes), formula, mechanism of action, which fungi they can be used against to date The antivirals: <ul style="list-style-type: none"> Information of at least five antivirals describing 	<ul style="list-style-type: none"> Moodle MS Teams Internet connection Laboratory Computer Projector Whiteboard Projector screen Microscope Various materials Class bibliography Laboratory book Social media

	<ul style="list-style-type: none"> Draws the chemical structure of the antimicrobials <p>Format criteria:</p> <ul style="list-style-type: none"> Submits on time and according to the guidelines The diagrams are clear, detailed and easy to understand 	on antimicrobial susceptibility testing	their formula, mechanism of action and which viruses they can be used against	
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7. Summative evaluation

Summative evaluation for the academic unit itemized by phases and evidences of learning.

Phase	Evidence and activities	Weighting
Phase 1 53%	Evidence 1. First theoretical-practical written evaluation	30 points
	Graded activity 1.1	2 points
	Graded activity 1.2	3 points
	Graded activity 1.3	4 points
	Graded activity 2.1	14 points
Phase 2 32%	Evidence 2. Second theoretical-practical written evaluation	30 points
	Graded activity 1.4	1 point
	Graded activity 2.2	1 point
Phase 3 5%	Evidence 3. Antifungals and antivirals diagram	5 points
CIP 10%	Solving a clinical case of fungi and viruses	10 points
Total		100 points

8. Course integrative Project/producto (CIP)

Proposal of a solution to theoretical and practical cases for the analysis of fungi and viruses in clinical samples, for which the student will select the laboratory tests for the identification of the etiological agent and interpretation the results.

9. References

Class bibliography:

- Bonifaz, A. (2015). *Micología Médica Básica 5ta ed.* México: Méndez Editores.
- Murray, P., Rosenthal, K. & Pfaller, M. (2021). *Microbiología Médica 9na ed.* España: Elsevier.
- Rothan, H.A. & Byrareddy, S.N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun*, 109, 102433.

Free use resources:

- Departamento de Microbiología FAMED-UANL. <http://www.microbiologia-medicinauanl.com.mx/>
- Departamento de Microbiología FAMED-UANL. <http://www.facebook.com/Departamento-de-Microbiología>
- Engleberg, C., & Imperiale, M. (2020). *Vaccines 2019*. Recuperado de: http://www.med.umich.edu/lrc/vaccines/main_page/main_frameset.htm
- Mount Sinai Hospital Joseph and Wolf Lebovic Health Complex. (2007). *Mycology Image Gallery*. Recuperado de: <https://eportal.mountsinai.ca/Microbiology/mig/index.shtml>



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MODULE DESCRIPTION (ANALYTIC PROGRAM)