

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):	Medical parasitology
Total number of class hours-theory and practice:	80
Class hours per week:	4 hours
Independent study:	10
Course modality:	Face-to-face instruction
Module level:	Third semester
Core/elective module:	Core
Curriculum area:	ACFP-F
UANL credit points:	3
Create date:	December 08 th , 2016
Date of last amendment made:	July 24 th , 2024
Person(s) responsible for the design and amendment of the module:	Design: Dr. C Romel Hernández Bello y Dr. C José Prisco Palma Nicolás Amendment: Dr. C Romel Hernández Bello

2. Presentation:

This Medical Parasitology module (learning unit, LU) is divided into three phases: in the first phase, the main groups of protozoan parasites that cause gastrointestinal diseases will be addressed, along with their epidemiology at the national and international levels, as well as both common and advanced methods used for their identification. In the second phase, the main groups of blood protozoan parasites will be reviewed, including their geographical distribution and the diagnostic and cutting-edge methods employed for their identification. Finally, in the third phase, all parasites from the helminth group, including nematodes, will be reviewed, covering their epidemiology, geographical distribution, and the various detection methods used for clinical diagnosis. In all phases, specific and detailed reviews will be conducted for each parasite, covering their morphological characteristics, pathology, virulence factors, diseases they cause, as well as their treatment, prevention, and control. For each parasite, a team will give a presentation on the topic, and at the end of each phase, students will demonstrate their learning through a theoretical-practical exam. At the end of the course, students will individually solve a clinical case, where they will propose one of the methodologies learned in the course to resolve the case.

3. Purpose:

Apply cutting-edge parasitological techniques, based on information from presumptive diagnoses through the identification of medically important protozoan and helminth parasites, to ensure the correct clinical diagnosis of the causative agent of disease, thereby enabling the physician to generate an appropriate therapy.

Regarding general competencies, the student will use both traditional and advanced identification methods and techniques for the clinical diagnosis of various parasitic diseases affecting humans. This will be achieved through the use of information following the formats or presentation styles established in the learning unit, respecting intellectual property rights. This competence will enable the student to address the public health challenges faced by contemporary society during natural disasters, both locally and globally, with a critical mindset and a commitment to human, academic, and professional development. The student will remain informed about local and global developments in economic, socio-cultural, ecological, and technological aspects of parasitology. Furthermore, the student will resolve social conflicts by applying these specific techniques within academic and scientific settings, contributing to the generation and application of knowledge for sound decision-making.

Regarding specific competencies, in the Medical Parasitology learning unit, the student will perform parasitological techniques, including sample collection, handling, storage, and analysis, to contribute to a clinical diagnosis. This will allow the student to interpret results based on established criteria and make timely and relevant decisions for the diagnosis.

The Medical Parasitology learning unit is strongly related to the Basic Microbiology learning unit, as it lays the foundation for the specialized study of protozoan and helminth parasites. In the case of the Cell Biology unit, it applies knowledge of cell division and the importance of cellular structures and their functions. It also contributes to the Diagnostic Medical Microbiology unit by providing knowledge of the main methods used to identify medically important parasites.

4. Competences of the graduate profile

General competences to which this module (learning unit) contributes:

- *Instrumental skills:*

8. To use traditional and cutting-edge research methods and techniques for the development of their academic work, the exercise of their profession and the generation of knowledge.

- *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:*

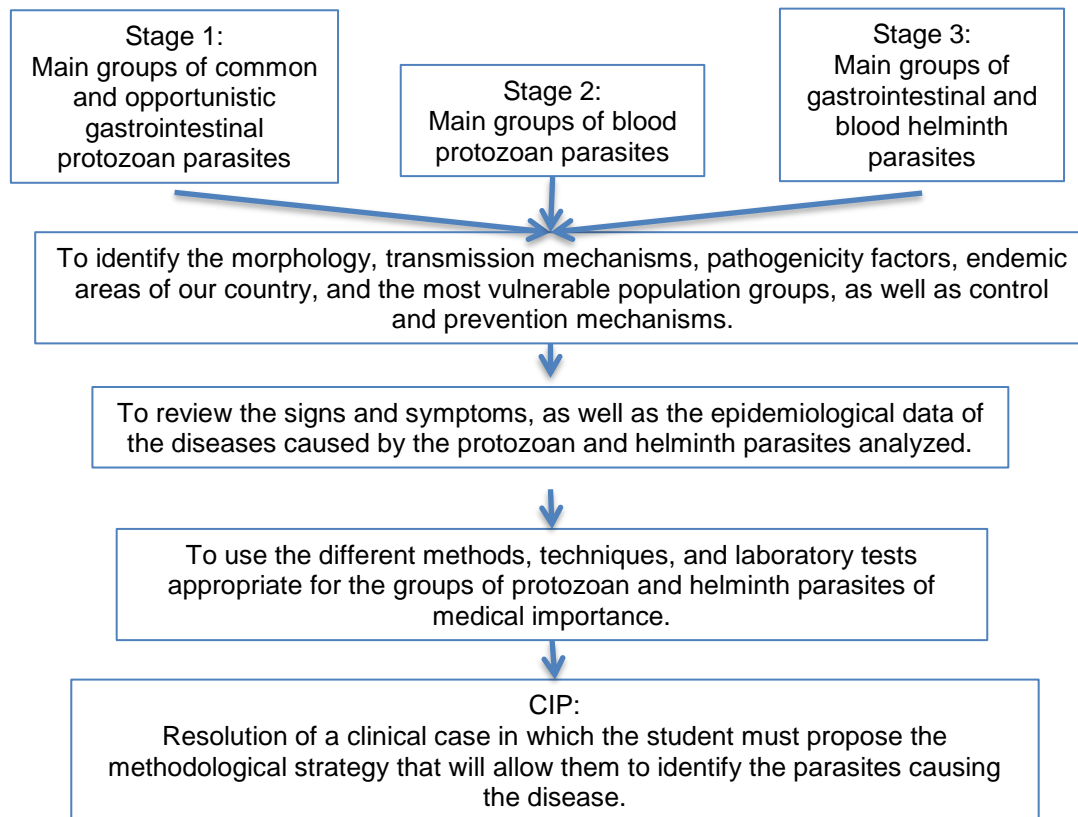
14. To resolve personal and social conflicts, in accordance with specific techniques in the academic field and in their profession for appropriate decision-making.

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

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

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:

Stage 1: Common and Opportunistic Gastrointestinal Protozoan Parasites.

Component(s) of the competence:

1.1 Morphologically identifies the main groups of protozoan parasites associated with gastrointestinal diseases through the application of appropriate physiological and biochemical tests in the Microbiology laboratory to generate an accurate diagnosis of the causative agent of the disease.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
1. Theoretical-practical assessment 1 on the main groups of protozoan parasites associated with gastrointestinal diseases.	<ul style="list-style-type: none"> • Upon completion of the stage. • Individually. • Using the written exam provided by the instructor. • Respecting the date and time indicated by the instructor. • Complete an exam with 25 theoretical questions and 5 clinical cases, including detection methods, microorganisms, and safety measures covered in the lab of the learning unit (LU). • Complete the theoretical-practical multiple-choice exam within 25 minutes. 	<ul style="list-style-type: none"> • The instructor organizes groups of 5 or 6 students based on the class list to form work teams for the semester. • The instructor administers a diagnostic exam on basic Parasitology knowledge and concepts to the students at the start of the learning unit (non-accredited activity). <p>1. The instructor provides the content for the Mind Map and bibliographic materials using the Moodle platform.</p> <ul style="list-style-type: none"> • The student reads the content related to the session and selects the keywords to complete each section of the mind map. • Creates the mind map electronically on the Mindomo platform. • Individually. 	<p>Theoretical Topics:</p> <ol style="list-style-type: none"> 1. General overview of protozoa and immune response to parasites 2. <i>Entamoeba histolytica</i>, <i>Acanthamoeba sp</i> and <i>Naegleria fowleri</i>. 3. <i>Giardia lamblia</i>, <i>Trichomonas vaginalis</i> and <i>Balantidium coli</i>. 4. <i>Cryptosporidium parvum</i>, <i>Cyclospora cayetanensis</i> and <i>Isospora belli</i> 	<ul style="list-style-type: none"> • Laptop, tablet, or computer with Microsoft Office suite and internet connection. • Microsoft Forms platform. • Moodle platform. • Kahoot platform. • Mindomo platform. • Microbiology lab manual. • Infrastructure of the Microbiology department. • Optical microscope. • Stereoscopic microscope. • Wash bottles with water, wash bottle with chlorine, wash bottles with 70° alcohol, lab coat, safety goggles, gloves. • Permanent slides of various gastrointestinal protozoan parasites. • Slides, coverslips, tweezers, spatula. • Reference materials: (Romel, 2017) (Patrick, 2017) (Marco, 2014) (Apt, 2013)

		<ul style="list-style-type: none"> • Summarizes the content clearly and concisely. • Uses the keywords related to the session's topic. • Creates one mind map per parasite discussed in each session and exports it to PDF. • The mind map must include the following sections: <ul style="list-style-type: none"> • Morphology (of the parasite) • Parasitic stages • Virulence factors (main ones) • Anatomical location • Diseases (caused by the parasite) • Transmission mechanisms • Diagnostic methods • Drugs (used for treatment) • Submits the mind map in PDF format within the specified date and time. • The student submits the complete mind map in PDF at least 4 days prior to the corresponding session via the Moodle platform (Accredited, out-of-class activity). <p>2. At the end of each session, students individually complete an online quiz of 10 questions (approximately 5 minutes) on the session's topic via the Microsoft Forms platform within 36 hours. A</p>		<ul style="list-style-type: none"> • Websites of interest: ((OMS), s.f.) (CDC, s.f.) (OMS, s.f.) (OPS, s.f.) (PLATAFORMA, s.f.)
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		<p>link to the quiz will be provided (accredited, out-of-class activity).</p> <ul style="list-style-type: none"> • A discussion forum is held at the end of the session on the content covered, where the student presents conclusions from the debate. <p>3. Before each lab session, the student must have read the introduction explaining the principle of the technique to be used (out-of-class activity).</p> <ul style="list-style-type: none"> • The student will complement this information with videos created for each lab practice (out-of-class activity). • The instructor will explain the methodology corresponding to the topic of the learning unit. • The student completes the activities for the lab session (in-person lab sessions). • The student records all methodological steps and makes diagrams and drawings of the protozoa identified during the lab session in their manual. • The instructor provides feedback on the results of the practical activities during the lab session. • At the end of the practice, the student prepares a learning report based on the findings obtained (in-person 		
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		<p>lab sessions).</p> <ul style="list-style-type: none"> • Upon concluding the practice, the student digitizes the evidence in PDF format and submits it online within 12 hours after the practice via the Moodle platform. • The student cleans their workspace at the end of the lab session. 		
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Stage 2: Blood and Systemic Protozoan Parasites

Component(s) of the competence:

Morphologically identifies the main groups of blood and systemic protozoan parasites through the application of appropriate physiological and biochemical tests in the Microbiology laboratory to generate an accurate diagnosis of the causative agent of the disease.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
2. Theoretical-practical assessment 2 on the main groups of blood and systemic protozoan parasites.	<ul style="list-style-type: none"> • Upon completion of the stage. • Individually. • Using the written exam provided by the instructor. • Respecting the date and time indicated by the instructor. • Complete an exam with 25 theoretical questions and 5 clinical cases, including detection methods, microorganisms, and safety measures covered in the lab of the learning unit (LU). • Complete the theoretical-practical multiple-choice exam within 25 minutes. 	<ul style="list-style-type: none"> • The instructor organizes groups of 5 or 6 students based on the class list to form work teams for the semester. • The instructor administers a diagnostic exam on basic Parasitology knowledge and concepts to the students at the start of the learning unit (non-accredited activity). 1. The instructor provides the content for the Mind Map and bibliographic materials using the Moodle platform. • The student reads the content related to the session and selects the keywords to complete each section of the mind map. • Creates the mind map electronically on the Mindomo platform. • Individually. • Summarizes the content clearly and concisely. 	Theoretical Topics: <ol style="list-style-type: none"> 6. <i>Toxoplasma gondii</i> 7. <i>Plasmodium spp</i> 8. <i>Leishmania spp</i> 9. <i>Trypanosoma spp</i> 	<ul style="list-style-type: none"> • Laptop, tablet, or computer with Microsoft Office suite and internet connection. • Microsoft Forms platform. • Moodle platform. • Kahoot platform. • Mindomo platform. • Microbiology lab manual. • Infrastructure of the Microbiology department. • Optical microscope. • Stereoscopic microscope. • Wash bottles with water, wash bottle with chlorine, wash bottles with 70° alcohol, lab coat, safety goggles, gloves. • Permanent slides of various gastrointestinal protozoan parasites. • Slides, coverslips, tweezers, spatula. • Reference materials: (Romel, 2017) (Patrick, 2017) (Marco, 2014) (Apt, 2013)

		<ul style="list-style-type: none"> • Uses the keywords related to the session's topic. • Creates one mind map per parasite discussed in each session and exports it to PDF. • The mind map must include the following sections: <ul style="list-style-type: none"> • Morphology (of the parasite) • Parasitic stages • Virulence factors (main ones) • Anatomical location • Diseases (caused by the parasite) • Transmission mechanisms • Diagnostic methods • Drugs (used for treatment) • Submits the mind map in PDF format within the specified date and time. • The student submits the complete mind map in PDF at least 4 days prior to the corresponding session via the Moodle platform (Accredited, out-of-class activity). <p>2. At the end of each session, students individually complete an online quiz of 10 questions (approximately 5 minutes) on the session's topic via the Microsoft Forms platform within 36 hours. A link to the quiz will be provided (accredited, out-of-class activity).</p> <ul style="list-style-type: none"> • A discussion forum is held at the end of the session on the content covered, where the 		<ul style="list-style-type: none"> • Websites of interest: ((OMS), s.f.) (CDC, s.f.) (OMS, s.f.) (OPS, s.f.) (PLATAFORMA, s.f.)
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		<p>student presents conclusions from the debate.</p> <p>3. Before each lab session, the student must have read the introduction explaining the principle of the technique to be used (out-of-class activity).</p> <ul style="list-style-type: none"> • The student will complement this information with videos created for each lab practice (out-of-class activity). • The instructor will explain the methodology corresponding to the topic of the learning unit. • The student completes the activities for the lab session (in-person lab sessions). • The student records all methodological steps and makes diagrams and drawings of the protozoa identified during the lab session in their manual. • The instructor provides feedback on the results of the practical activities during the lab session. • At the end of the practice, the student prepares a learning report based on the findings obtained (in-person lab sessions). • Upon concluding the practice, the student digitizes the evidence in PDF format and submits it online within 12 hours after the practice via the Moodle platform. • The student cleans their 		
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		workspace at the end of the lab session.		
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Stage 3. Gastrointestinal and systemic helminth parasites

Component(s) of the competence:

Morphologically identifies the main groups of gastrointestinal and systemic helminth parasites through the application of appropriate physiological and biochemical tests in the Microbiology laboratory to generate an accurate diagnosis of the causative agent of the disease.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
<p>3. Theoretical-practical assessment 3 on the main groups of gastrointestinal and systemic flatworm parasites.</p> <p>4. Theoretical-practical assessment 4 on the main groups of gastrointestinal and systemic nematode parasites.</p>	<ul style="list-style-type: none"> • Upon completion of the stage. • Individually. • Using the written exam provided by the instructor. • Respecting the date and time indicated by the instructor. • Complete an exam with 25 theoretical questions and 5 clinical cases, including detection methods, microorganisms, and safety measures covered in the lab of the learning unit (LU). • Complete the theoretical-practical multiple-choice exam within 25 minutes. 	<ul style="list-style-type: none"> • The instructor organizes groups of 5 or 6 students based on the class list to form work teams for the semester. • The instructor administers a diagnostic exam on basic Parasitology knowledge and concepts to the students at the start of the learning unit (non-accredited activity). <p>1. The instructor provides the content for the Mind Map and bibliographic materials using the Moodle platform.</p> <ul style="list-style-type: none"> • The student reads the content related to the session and selects the keywords to complete each section of the mind map. 	<p>Theoretical Topics:</p> <p>10. General overview of helminths</p> <p>11. <i>Enterobius vermicularis</i> and <i>Trichuris trichiura</i></p> <p>12. <i>Necator americanus</i> and <i>Ancylostoma duodenalis</i></p> <p>13. <i>Ascaris lumbricoides</i> and <i>Onchocerca volvulus</i></p> <p>14. <i>Taenia solium</i>, <i>T. saginata</i> and <i>Hymenolepis nana</i></p> <p>15. <i>Fasciola hepática</i> and <i>Schistosoma mansoni</i></p>	<ul style="list-style-type: none"> • Laptop, tablet, or computer with Microsoft Office suite and internet connection. • Microsoft Forms platform. • Moodle platform. • Kahoot platform. • Mindomo platform. • Microbiology lab manual. • Infrastructure of the Microbiology department. • Optical microscope. • Stereoscopic microscope. • Wash bottles with water, wash bottle with chlorine, wash bottles with 70° alcohol, lab coat, safety goggles, gloves. • Permanent slides of various gastrointestinal protozoan parasites.

		<ul style="list-style-type: none"> • Creates the mind map electronically on the Mindomo platform. • Individually. • Summarizes the content clearly and concisely. • Uses the keywords related to the session's topic. • Creates one mind map per parasite discussed in each session and exports it to PDF. • The mind map must include the following sections: <ul style="list-style-type: none"> • Morphology (of the parasite) • Parasitic stages • Virulence factors (main ones) • Anatomical location • Diseases (caused by the parasite) • Transmission mechanisms • Diagnostic methods • Drugs (used for treatment) • Submits the mind map in PDF format within the specified date and time. • The student submits the complete mind map in PDF at least 4 days prior to the corresponding session via the Moodle platform (Accredited, out-of-class activity). 		<ul style="list-style-type: none"> • Slides, coverslips, tweezers, spatula. • Reference materials: (Romel, 2017) (Patrick, 2017) (Marco, 2014) (Apt, 2013) • Websites of interest: ((OMS), s.f.) (CDC, s.f.) (OMS, s.f.) (OPS, s.f.) (PLATAFORMA, s.f.)
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		<p>2. At the end of each session, students individually complete an online quiz of 10 questions (approximately 5 minutes) on the session's topic via the Microsoft Forms platform within 36 hours. A link to the quiz will be provided (accredited, out-of-class activity).</p> <ul style="list-style-type: none"> • A discussion forum is held at the end of the session on the content covered, where the student presents conclusions from the debate. <p>3. Before each lab session, the student must have read the introduction explaining the principle of the technique to be used (out-of-class activity).</p> <ul style="list-style-type: none"> • The student will complement this information with videos created for each lab practice (out-of-class activity). • The instructor will explain the methodology corresponding to the 		
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		<p>topic of the learning unit.</p> <ul style="list-style-type: none"> • The student completes the activities for the lab session (in-person lab sessions). • The student records all methodological steps and makes diagrams and drawings of the protozoa identified during the lab session in their manual. • The instructor provides feedback on the results of the practical activities during the lab session. • At the end of the practice, the student prepares a learning report based on the findings obtained (in-person lab sessions). • Upon concluding the practice, the student digitizes the evidence in PDF format and submits it online within 12 hours after the practice via the Moodle platform. • The student cleans their workspace at the end of the lab session. 		
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7. Summative evaluation:

Stage	Evidence	Weighing
Stage 1	Evidence 1. Theoretical Assessment (Exam 1) of the Topics 1-5	3%
	Accredited activity: Written Report of Laboratory Practices	2 %
	Accredited activity: Mind Maps of the Topics 1-5	5 %
	Accredited activity: Online Quiz on Microsoft Forms	9 %
Stage 2	Evidence 2. Theoretical Assessment (Exam 2) of the Topics 6-9	3 %
	Accredited activity: Written Report of Laboratory Practices	2 %
	Accredited activity: Mind Maps of the Topics 6-9	5 %
	Accredited activity: Online Quiz on Microsoft Forms	9 %
Stage 3	Evidence 3. Theoretical Assessment (Exam 2) of the Topics 10-12	6 %
	Evidence 4. Theoretical Assessment (Exam 2) of the Topics 13-15	4 %
	Accredited activity: Written Report of Laboratory Practices	10 %
	Accredited activity: Mind Maps of the Topics 6-9	9 %
	Accredited activity: Online Quiz on Microsoft Forms	9 %
CIP	Course integrative project/product	24 %

	Total	100 %
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8. Course integrative project/product:

Report on clinical cases in which the student must propose the methodological strategy that allows them to identify the causative parasite(s) of the disease.

9. References:

Romel, H. B. (2017). *Compendio de Parasitología Médica para QCB*. Monterrey: UANL.

Marco, B. (2014). *Parasitología Médica*. Mexico: Mc Graw Hill.

Apt, W. (2013). *Parasitología Humana*. Mexico: McGraw-Hill.

Patrick, M. (2017). *Microbiología Médica*. México: Elsevier.

CDC. (s.f.). CDC. Obtenido de US - Centers for Diseases Control and Prevention (CDC): <http://www.cdc.gov>

(OMS), M. d. (s.f.). *Manual de Bioseguridad en el Laboratorio (OMS)*. Obtenido de Manual de Bioseguridad en el Laboratorio (OMS): http://www.who.int/topics/medical_waste/manual_bioseguridad_laboratorio.pdf

DGAE. (s.f.). *Dirección General Adjunta de Epidemiología*. Obtenido de Dirección General Adjunta de Epidemiología: <http://www.dgepi.salud.gob.mx>

OMS. (s.f.). *Organización Mundial de la Salud*. Obtenido de OMS-WHO: <http://www.who.int>

OPS. (s.f.). *Organización Panamericana de la Salud*. Obtenido de Organización Panamericana de la Salud: <http://www.paho.org>

PLATAFORMA. (s.f.). *Plataforma Medicina*. Obtenido de Plataforma: <http://www.medicina.uanl.mx/plataforma/a>

SSa. (s.f.). *Secretaría de Salud*. Obtenido de Secretaría de Salud: <http://www.ssa.gob>