UNIVERSIDAD AUTONOMA DE NUEVO LEON
SCHOOL OF MEDICINE
MODULE DESCRIPTION (ANALYTIC PROGRAM)

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):	General exit examination course
Total number of class hours-theory and practice:	72
Class hours per week:	4 hours
Independent study:	18
Course modality:	Face-to-face instruction
Module level:	Ninth semester
Core/elective module:	Core
Curriculum area:	ACFP-I
UANL credit points:	3
Create date:	June 4th, 2018
Date of last amendment made:	August 29th, 2022
Person(s) responsible for the design and amendment of the module:	Dr. E. Jorge M. Llaca Díaz, Dra. E. Diana G. RoblesEspino, Dra. Sonia Lozano Quintanilla

2. Presentation:

The learning unit General exit examination course consists of three phases structured to equip students to present the integrative learning product.

In Phase 1, Diagnostic by the Laboratory, students connect pathophysiology with communicable and non-communicable diseases and the tests used for diagnosis, differentiating them based on diagnostic criteria.

Phase 2, Clinical Analysis, involves students examining the pre-analytical, analytical, and post-analytical stages in areas such as clinical biochemistry, hematology, immunohematology, immunology, endocrinology, microbiology, and molecular biology to determine the appropriate tests and methods.

Finally, Phase 3, Laboratory Management, allows students to relate the concepts of quality assurance in clinical laboratory operations, as well as the current health regulations and guidelines used for organizing, developing procedures, disposing of hazardous biological infectious waste, and ensuring safety to guarantee proper management of the clinical laboratory.

The evidence and activities developed throughout the semester, along with the integrative learning product, guide students in integrating the knowledge from this learning unit with that obtained in other units of the curriculum, bringing them closer to the real context of the application of the General Examination of Graduation in Clinical Chemistry (EGEL-QUICLI).

3. Purpose:

The purpose of this learning unit is to contribute to the training of students for the General Examination for Graduation in Clinical Chemistry, which evaluates the specific knowledge and skills required for the professional activities of a Clinical Chemist. This integrates the knowledge acquired during the degree in areas such as laboratory diagnosis, clinical analysis, and laboratory management.

This learning unit supports the achievement of three general competencies by preparing students for the selection and use of research methods and techniques necessary for the relevant development of the professional activities of a Clinical Chemist. As students prepare for their personal progress and the challenge of facing the General Examination for Graduation in Clinical Chemistry, they do so with professional ethics, fairness, and responsibility. Additionally, they demonstrate the ability to empathize with others in resolving personal conflicts and working as a team.

Regarding the fulfillment of the specific competencies of the degree, the learning unit integrates all areas related to Clinical Chemistry, enabling students to acquire each competency through problem-solving by applying knowledge of the chemistry of matter and its properties to determine the analytes of interest in biological samples. It adheres to official Mexican and international regulations to ensure the proper use and disposal of chemical and biological materials. Moreover, it involves interpreting analysis results based on established criteria to make decisions and perform timely diagnoses.

The General exit examination course is offered in the ninth semester of the educational program for Clinical Chemist and is fully aligned with the content of other learning units in the clinical area taught in previous semesters, such as Hematology, Diagnostic medical microbiology, Clinical biochemistry, Blood bank, Immunology, Molecular biology, and Management and quality in the clinical laboratory. The achievement of competencies in the previous learning units provides the foundation for the professional development of the Clinical Chemist.

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:

11. To practice the values promoted by the UANL: truth, equity, honesty, freedom, solidarity, respect for life and others, peace, respect for nature, integrity, ethical behavior, and justice, in their personal and professional environment to contribute to building a sustainable society.

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.

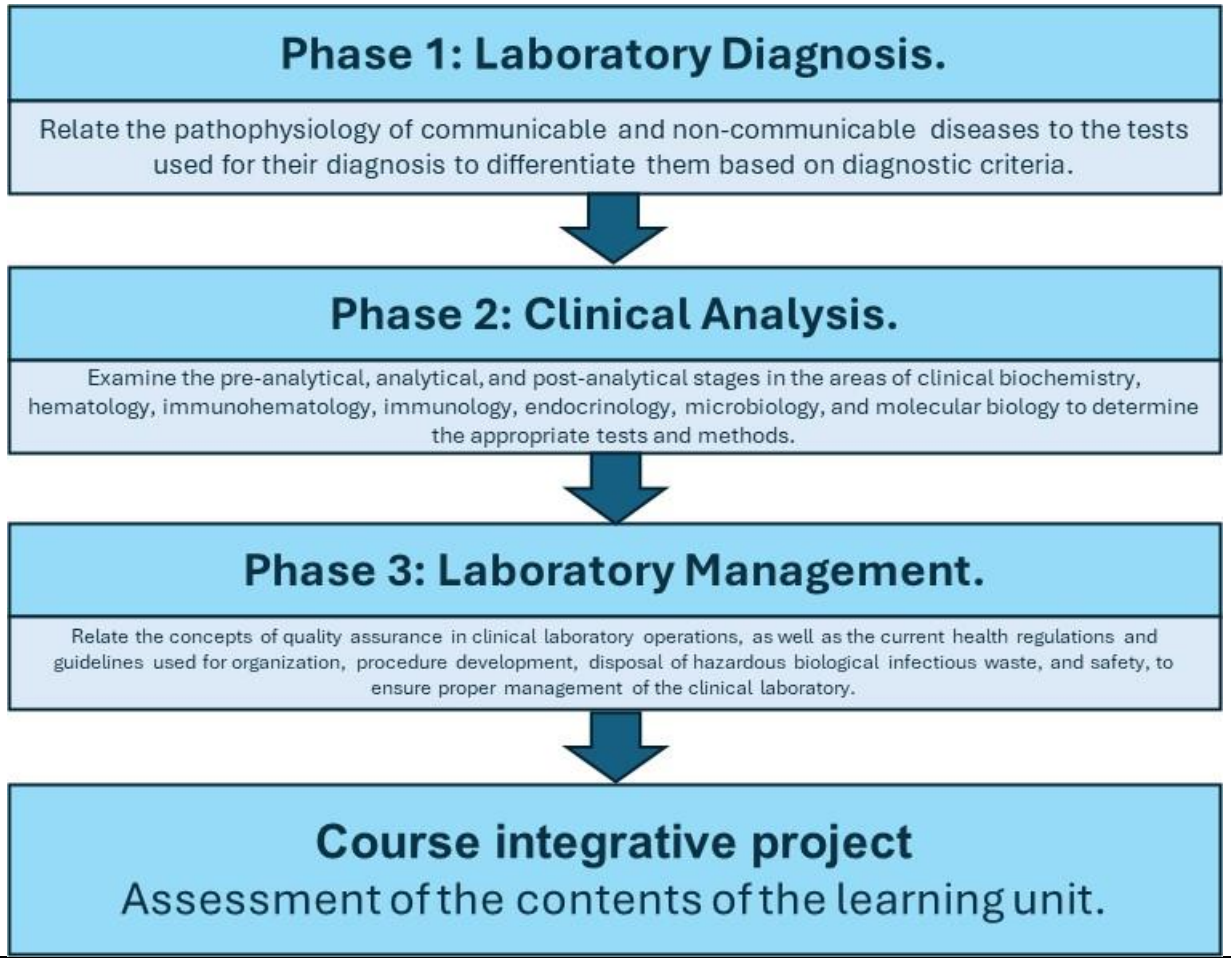
Specific competences of the graduate profile to which this module (learning unit) contributes:

1. To solve problems by applying knowledge of the chemical composition of matter as well as its physicochemical properties to determine analytes in biological, environmental and food matrices.

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:

Stage 1: Laboratory Diagnosis.

Component(s) of the competence: Relate the pathophysiology of communicable and non-communicable diseases to the tests used for their diagnosis to differentiate them based on diagnostic criteria.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
1. Resolution of the assessment regarding the tests for the diagnosis of communicable and non-communicable diseases.	Consider the pathophysiology and laboratory tests for the diagnosis of communicable and non-communicable diseases. Complete the assessment for Phase 1 individually in the classroom on the designated day and time.	The student completes the assigned reading in advance of the class, according to the schedule published on MS Teams. The professor presents the topic using infographics and CENEVAL-style questions. The student takes notes and completes a diagnostic quiz provided by the professor at the beginning of the class. 1. Quiz on the pathophysiology and laboratory tests for the diagnosis of communicable diseases (Weighted Activity 1.1) 2. Quiz on the pathophysiology and laboratory tests for the	- Pathophysiology of communicable diseases. - Tests for the diagnosis of communicable diseases. - Pathophysiology of non-communicable diseases. - Tests for the diagnosis of non-communicable diseases.	- Computer equipment with internet access. - Microsoft Teams and Moodle platforms. - Web consultation sources for free use: - Spanish Society of Laboratory Medicine - Spanish Society of Hematology and Hemotherapy. - Spanish Society of Immunology. - Spanish Society of Microbiology. - Readings: Forbes (2009) Section 1: Safety and sample processing. - Winn (2008) Chapter 2. Part II:

		diagnosis of non-communicable diseases (Weighted Activity 1.2) The student research sites with open educational resources. The student verifies compliance with the required elements in the guide for Evidence 1.		Guidelines for the collection, transport, processing, analysis, and reporting of cultures from specific site samples. - Henry (2007) Chapter 1: Organization, objectives, and practice.

Stage 2: Clinical Analysis.
Component(s) of the competence:
Examine the pre-analytical, analytical, and post-analytical stages in the areas of clinical biochemistry, hematology, immunohematology, immunology, endocrinology, microbiology, and molecular biology to determine the appropriate tests and methods.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
2. Resolution of the assessment regarding the three phases of the clinical laboratory in the areas of clinical biochemistry, hematology, immunohematology, immunology, endocrinology, microbiology, and molecular biology.	Consider the pre-analytical, analytical, and results interpretation phases in the areas of clinical biochemistry, hematology, immunohematology, immunology, endocrinology, microbiology, and molecular biology. Complete the assessment for Phase 2 individually in the classroom on the designated day and time.	The student completes the assigned reading in advance of the class, according to the schedule published on MS Teams. The professor presents the topic using infographics and CENEVAL-style questions. The student takes notes and completes a diagnostic quiz provided by the professor at the beginning of the class. 1. Quiz on the pre-analytical, analytical, and results interpretation phases in clinical biochemistry (Weighted Activity 2.1) 2. Quiz on the pre-analytical, analytical, and results interpretation	- List of laboratory tests to be performed - Type of sample required - Identification and preparation of the patient for sample collection - Instructions and special precautions for the collection and preservation of each type of sample - Instructions for the transport of samples - Conditions that the study request must meet - Preparation of materials for sample collection - Sample collection for microbiological analysis	- Computer equipment with internet access. - Microsoft Teams and Moodle platforms. - Web consultation sources for free use: - Spanish Society of Laboratory Medicine - Spanish Society of Hematology and Hemotherapy. - Spanish Society of Immunology. - Spanish Society of Microbiology. - Readings: Forbes (2009) Section 1: Safety and sample processing. - Winn (2008) Chapter 2. Part II:

		phases in hematology and immunohematology (Weighted Activity 2.2) 3. Quiz on the pre-analytical, analytical, and results interpretation phases in microbiology (Weighted Activity 2.3) 4. Quiz on the pre-analytical, analytical, and results interpretation phases in immunology and endocrinology (Weighted Activity 2.4) 5. Quiz on the pre-analytical, analytical, and results interpretation phases in molecular biology (Weighted Activity 2.5) The student research sites with resources...	- Fundamentals of chemical-biological analyses conducted in the areas of clinical biochemistry, hematology, immunohematology, microbiology, immunology, endocrinology, and molecular biology - Comprehensive interpretation of laboratory test results conducted in the areas of clinical biochemistry, hematology, immunohematology, microbiology, immunology, endocrinology, and molecular biology	Guidelines for the collection, transport, processing, analysis, and reporting of cultures from specific site samples. - Henry (2007) Chapter 1: Organization, objectives, and practice.

Stage 3. Laboratory Management.
Component(s) of the competence:
Relate the concepts of quality assurance in clinical laboratory operations, as well as the current health regulations and guidelines used for organization, procedure development, disposal of hazardous biological infectious waste, and safety, to ensure proper management of the clinical laboratory.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
3. Resolution of the assessment regarding quality assurance, regulations, and biosafety in the clinical laboratory.	Consider the quality assurance of processes, the current regulations regarding the organization and operation of laboratories, as well as the disposal of hazardous biological infectious waste. Complete the assessment for Phase 3 individually in the classroom on the designated day and time.	The student completes the assigned reading in advance of the class, according to the schedule published on MS Teams. The professor presents the topic using infographics and CENEVAL-style questions. The student takes notes and completes a diagnostic quiz provided by the professor at the beginning of the class. 1. Quiz on quality assurance in the clinical laboratory (Weighted Activity 3.1) 2. Quiz on applicable regulations for the clinical laboratory (Weighted Activity 3.2) 3. Quiz on biosafety in the clinical laboratory (Weighted Activity 3.3)	- Quality assurance of laboratory equipment - Preventive, corrective actions, and non-conformities in the clinical laboratory - Quality assurance of laboratory results - Mandatory and non-mandatory regulations for the organization of the clinical laboratory - Biosafety in the clinical laboratory - Safety and handling of substances and reagents	- Computer equipment with internet access - Microsoft Teams and Moodle platforms - Web consultation sources for free use: NOM-007-SSA3-2011, Para la organización y funcionamiento de los laboratorios clínicos. NOM-087-ECOL-SSA1-2002, Protección ambiental-Salud ambiental - Residuos peligrosos biológico- infecciosos - Clasificación y especificaciones de manejo. NMX-CC-9001- IMNC-2015, Sistemas de gestión de la calidad- requisitos. NMX-EC-15189- IMNC-2015,

		The student research sites with open educational resources. The student verifies compliance with the required elements in the guide for Evidence 3.		Laboratorios clínicos-requisitos de la calidad y competencia.

7. Summative evaluation:

Phase 1: Laboratory diagnosis	
Evidence 1. Written evaluation resolution regarding tests for the diagnosis of communicable and non-communicable diseases	15%
Weighted activity 1.1 Pathophysiology and laboratory test items for the diagnosis of communicable diseases	3 %
Weighted activity 1.2 Items related to pathophysiology and laboratory tests for the diagnosis of non-communicable diseases	3 %

Phase 2: Clinical analysis	
Evidence 2. Written evaluation resolution regarding the three phases of the clinical laboratory in the areas of clinical biochemistry, hematology, immunohematology, immunology, endocrinology, microbiology, and molecular biology	15%
Weighted activity 2.1 Reagents referring to the pre-analytical, analytical and interpretation phases of clinical biochemistry test results	3 %
Weighted activity 2.2 Reagents referring to the pre-analytical, analytical and interpretation phases of hematology and immunohematology test results	3 %
Weighted activity 2.3 Reagents referring to the pre-analytical, analytical and interpretation phases of microbiology test results	3 %
Weighted activity 2.4 Reagents related to the pre-analytical, analytical and interpretation phases of immunology and endocrinology test results	3 %
Weighted activity 2.5 Reagents related to the pre-analytical, analytical and interpretation phases of molecular biology test results	3 %
Phase 3: Laboratory Management	
Evidence 3. Written evaluation resolution regarding quality assurance, regulations, and biosafety in the clinical laboratory	15%
Weighted activity 3.1 Reagents related to quality assurance in the clinical laboratory	3 %
Weighted activity 3.2 Reagents referring to the regulations applicable to the clinical laboratory	3 %
Weighted activity 3.3 Biosafety reagents in the clinical laboratory	3 %
Learning Integrator Product	25%
Total	100%

8. Course integrative project/product:
Written report about a clinical case study assigned by the professor. In this report, he will provide an adequate methodological and conceptual strategy that will let him differentiate groups of microorganisms that are causing an illness.

9. References:

Delves, P., Martin, S., Burton, D. y Roitt, I. (2014) *Inmunología Fundamentos*. Argentina: Editorial Panamericana.

Forbes, B. A., Sahm, A. y Weissfeld A. (2009). *Bailey & Scott's Diagnóstico Microbiológico*. Argentina: Editorial Panamericana.Henry, J.B. (2007). *El Laboratorio en el Diagnóstico Clínico*. España: Editorial Marbán.

Mazziotta, D. y Fernández, C. (2005). *Gestión de la Calidad en el Laboratorio Clínico.* Argentina: Editorial Panamericana.Parslow, T., Stites D. y Terr A. (2003). *Inmunología básica y clínica*. México: Editorial Manual Moderno.

Winn, W., Allen, S., Janda, W., Koneman, E., Procop, G., Schrenckengerger, P. y Woods, G. (2008). *Diagnóstico Microbiológico*.Argentina: Editorial Panamericana.

WEB RESOURCES FOR FREE USE:

Centro Nacional de Evaluación para la Educación Superior, A.C. (2016). Guía para el sustentante Examen General para elEgreso de la Licenciatura en Química Clínica (EGEL-QUICLI). Recuperado 23 julio de 2020. https://www.ceneval.edu.mx/documents/20182/35022/GuiaEGEL-QUICLI.pdf/eddc174f-b55d-4c2e-9c49-3a6349e22b1f

Manual de Bioseguridad en el Laboratorio, Tercera Edición, OMS. Recuperado el 01 de agosto de 2020, de https://www.who.int/topics/medical_waste/manual_bioseguridad_laboratorio.pdf?ua=1

Secretaría de Economía. (2015). NMX-CC-9001-IMNC-2015, *Sistemas de gestión de la calidad-requisitos*. Diario Oficial de la Federación. Recuperado 23 de enero de 2017, de http://www.dof.gob.mx/nota_detalle.php?codigo=5435775&fecha=03/05/2016

Secretaría de Economía. (2015). NMX-EC-15189-IMNC-2015, Laboratorios clínicos-requisitos de la calidad y competencia. Diario Oficial de la Federación. Recuperado 23 de enero de 2017, de http://www.dof.gob.mx/nota_detalle.php?codigo=5393609&fecha=26/05/2015

Spanish Society of Microbiology
https:// www.semicrobiologia.org/

Spanish Society of Laboratory Medicine
http://www.seqc.es/

Spanish Society of Hematology and Hemotherapy
https://sehh.es/

Spanish Society of Immunology
https:// www.inmunologia.org/