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):	Clinical pathology
Total number of class hours-theory and practice:	360
Class hours per week:	18 hours
Independent study:	60
Course modality:	Face-to-face instruction
Module level:	Seventh semester
Core/elective module:	Core
Curriculum area:	ACFP-I
UANL credit points:	14
Create date:	October 15th, 2018
Date of last amendment made:	June 28th, 2024
Person(s) responsible for the design and amendment of the module:	Dr. E. Jorge M. Llaca Díaz, Dra. E. Diana G. RoblesEspino.

2. Presentation:

This learning unit is developed in two phases: during the first phase, the importance of the clinical laboratory in outstanding topics of hematology, blood banking, clinical biochemistry and endocrinology is analyzed. The student will describe the laboratory and quality control tests used in each case and will be able to recognize the characteristics of sensitivity and diagnostic specificity of the same. Likewise, you will be able to identify the possible occupational and patient risks that may occur in each phase of the process.

In the second phase, the student will carry out their curricular practice under supervision, performing analyses safely and reliably in the clinical laboratory
Finally, as an integrating product of learning, the student will make a written proposal for the solution of cases of hematology, blood banking, clinical biochemistry and endocrinology.

3. Purpose:

Contribute to achieving the profile of the graduate in the domain corresponding to the profession of Clinical Pathology, by developing the necessary competencies to carry out the processes of the clinical laboratory through the validation, design, selection and/or execution of different methods of analysis, properly interpreting the results of patient samples, under strict quality control that allows them to make timely and pertinent decisions; to collaborate in the prevention, diagnosis, control and treatment of diseases.

In relation to general competencies, the student will be able to handle the information technologies used in laboratory automation. Manifests human, academic and professional commitment to contribute to the well-being of the patient and respect for the environment. Act with empathy in conflicts during teamwork.

At Clinical Pathology, students acquire specific skills that allow them to obtain, handle, store and analyze samples for clinical diagnosis. Likewise, it drives responsibly according to national and international regulations.
international standards, chemical and biological materials, to protect health and the environment. Interpret the results of analyses that allow them to make timely decisions in the diagnosis of diseases.

Clinical Pathology integrates the competencies acquired in Hematology where it studies the elements that form blood and their precursors, as well as the structural and biochemical disorders of these elements, which can lead to disease. Clinical Biochemistry applies chemical and biochemical laboratory methods to the diagnosis, treatment control, prevention, and investigation of disease. In Immunology, he identifies elements that participate in the immune response for the prevention, diagnosis and treatment of the disease. Of diagnostic medical microbiology, it analyzes, selects and executes methods of identification and sensitivity tests, for the prevention, diagnosis and treatment of infectious diseases.

It provides fundamental bases in the development of Social Service, Professional Practices and for the General Exit Exam of the bachelor's degree in clinical chemistry.

4. Competences of the graduate profile

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

Instrumental skills:

3. To manage Digital Information, Communication, Knowledge and Learning Technologies (TICCAD), in academic, personal and professional environments with cutting-edge techniques that allow their constructive and collaborative participation in society.

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.

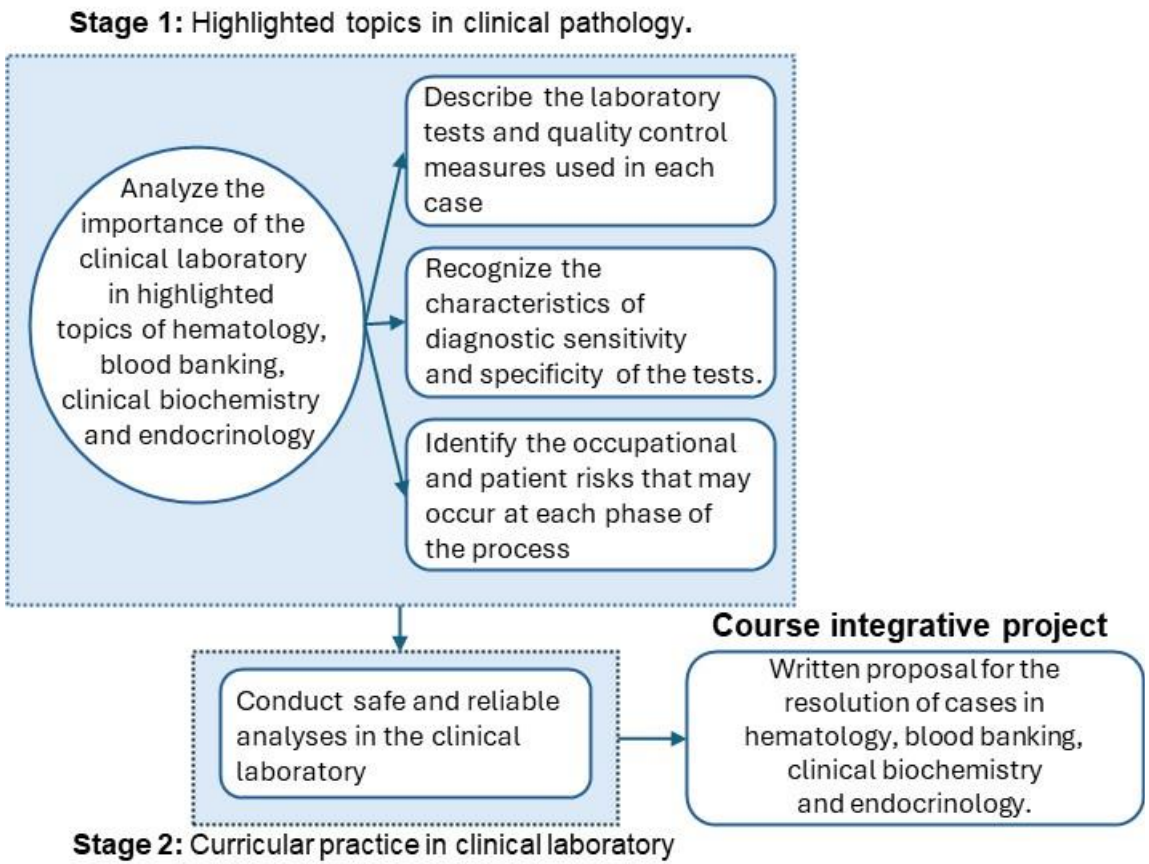
Specific competences of the graduate profile to which this module (learning unit) contributes:

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.

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: Highlighted Topics in Clinical Pathology**.**

Component(s) of the competence: Analyze selected topics in clinical pathology based on relevant and current literature to understand the importance of improving the diagnostic services provided by the clinical laboratory.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
1. Portfolio of case resolution reports.	Carry out the case report as a team during class time according to the previous schedule. Identify the problem by considering the data described in the case. Propose a viable solution or diagnosis. Argue the possible causes or solutions Use terminology adequate medical The use of electronic devices is not allowed for the solution of the case.	The teacher, prior to the theoretical session, shares reference literature on the topic to be reviewed in MS Teams according to the schedule. Prior to the session, the student reads the reference literature. The student individually takes the questionnaire on the reference literature of the topic to be reviewed. (Weighted activity 1.1). During the class, the teacher exposes the key concepts through electronic presentations, infographics and examples of the topics of the content.	1- Phases and activities of the laboratory process. Risk Analysis in the Clinical Laboratory. 2- Standards of Diagnostic Auxiliary Services of the General Health Council. 3- Diagnostic sensitivity and specificity. Predictive value, and rational use of laboratory tests. 4- Analytical methodologies used in the donor profile: HIV, HCV, HBsAg, Brucella, Chagas. Causes of false positives and false negatives in the profile of Donor. Causes of blood incompatibility Alternatives in the patient with blood incompatibility. Patient safety in blood	Computer equipment with Microsoft Office and internet connection. Moodle platform, and Microsoft Teams. Electronic presentation for free use prepared by the professor. Reading: Consejo de Salubridad General. Modelo de Seguridad del Paciente., Pages 229-240 Henry, J.B. (2007) Chapter 7, Experimental statistics. Radillo-González, A. (2017). Chapter 15 and 18. González, A. (2010). 22, 25

		The student individually participates in the sessions actively analyzing the contents reviewed in the theoretical sessions. The teacher asks interspersed questions during the presentations about the content. The student answers individually by brainstorming the questions asked by the teacher during the session. The student solves the content knowledge exam of phase 1 that includes topics 1 to 5 (Weighted activity 1.2). The student individually solves the content knowledge test of phase 1 that includes topics 6 to 10. (Weighted activity 1.3).	transfusion. 5- Methods of obtaining hematopoietic stem cells. Isolation and identification of hematopoietic stem cells. Current and future applications of hematopoietic stem cells. Other types of stem cells. 6- Stages of the Hematology process. Identification of frequent errors in the Hematology process. Quality control techniques applicable in the Hematology process. 7- Female sex hormones LH, FSH, Progesterone, Estradiol, Prolactin and their usefulness Diagnostic. Sensitivity and diagnostic specificity of female sex hormones. Thyroid profile: TSH, Total and free T3, Total and free T4, Thyroglobulin, Antithyroglobulin antibodies and their diagnostic utility. Sensitivity and diagnostic specificity of the thyroid profile. 8- Cardiac profile: LDH, AST, CK, CKMB,	to 27, 30. Strasinger, S. & Di Lorenzo, M. (2010). Chapter 2 to 6. Asociación Mexicana de Medicina Transfusional, A.C.

			Troponin, Myoglobin, C-reactive protein and its usefulness in the diagnosis of acute heart disease. Sensitivity and diagnostic specificity of the cardiac profile. 9- Analysis of body fluids: Peritoneal, pleural, Synovial, Cerebrospinal Suitable tests according to the patient's origin and clinical diagnosis. Sample conservation, acceptance and rejection criteria. Validation of results and clinical correlation of laboratory tests. Quality Control in pre-analytical, analytical (strip and sediment) and post-analytical urinalysis. 10- Reflectance and principles of Dry Chemistry, tests performed, advantages and disadvantages over wet chemistry.	

Stage 2: Curricular practice in clinical laboratory.
Component(s) of the competence:
Perform analyses in the clinical laboratory under the supervision of a professional, while considering quality principles and patient safety, to contribute to timely and reliable diagnosis.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
2.Report of Internship of clinical laboratory.	Internship report: Deliver the report individually and considering the criteria established by the Professor, respecting the delivery date on the Moodle platform in PDF format. It has a maximum of 4 pages, written in Word, with an additional cover page and complete identification data. It includes the activities carried out in all sections of the in which he was assigned and outstanding concepts	For each section of the laboratory: The student reads the corresponding procedures and equipment manuals according to the section of the laboratory to which he or she was assigned. The student participates in the training for induction to clinical practice on the scheduled date. (Weighted Activity 2.1) Performs clinical practice in the assigned area and schedule under supervision, which is evaluated by of rubric. (Weighted Activity 2.2).	Tests carried out in the different areas of the Laboratory: 1- Hematology; blood count, erythrocyte sedimentation rate, peripheral blood smear, prothrombin time, partial thromboplastin time, calibration and quality control of equipment. 2- Clinical Biochemistry; biochemical profile, creatinine clearance and other special tests, calibration and quality control of equipment. 3- Urinalysis; general urine test, tests 24-hour proteins, calibration and quality control of equipment. 4- Parasitology; parasite staining. 5- Serologies; febrile	Computer equipment with Microsoft Office and internet connection. Platform of the UANL. MS Teams. Miscellaneous materials: slides, applicators, lancets, swabs, pipettes, syringes, etc. Various equipment and reagents: CELL-DYN Ruby, Hematology Analyzer. DxC800 chemistry analyzer.

	from the procedure manuals to which he had access.		reactions, VDRL, rheumatoid factor. 6- Bacteriology; stains and cultures of various body specimens. 7- Mycobacteria; Tuberculosis stains and cultures of various body specimens. 8- Blood gases; Determination of arterial and venous gases. 9- Blood bank; determination of blood type, selection and extraction of blood from donors, fractionation of blood units, quality control of blood units, serological tests to blood units and blood compatibility tests. 10- Endocrinology; thyroid function tests, female hormonal profiles, functional tests of stimulation and suppression.	

7. Summative evaluation:

Stage	Evidence and weighted activities	Weighting
Phase 1 50%	**Evidence 1.** Portfolio of case resolution reports	**10%**
	Weighted activity 1.1 Pre-reading questionnaire	**10%**
	Weighted activity 1.2 Knowledge test of the content of phase 1 (Topics 1 to 5).	**15%**
	Weighted activity 1.3 Knowledge test of the content of phase 1 (Topics 6 to 10).	**15%**
Phase 2 30%	**Evidence 2.** Clinical laboratory practice report.	**5%**
	Weighted activity 2.1 Training for induction to clinical practice.	**5%**
	Weighted activity 2.2 Execution of the internship under supervision.	**20%**
Course integrative project 20%	Written evaluation of solution of cases in microbiology, hematology, blood banking, immunology and clinical biochemistry.	**20%**
	Total	**100%**

Evaluation criteria:
To complete the sum of phase 1 with phase 2 and the PIA, it is a requirement to attend at least 80% of the laboratory practices. If this requirement is not met, the final grade will be the sum of phase 1 and the PIA. In case of justified absence, the practice must be remade during the replacement period indicated in the calendar.

8. Course integrative project/product:

Written evaluation for the solution of cases in hematology, blood banking, clinical biochemistry and endocrinology.

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

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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/