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):	Morphological Sciences
Total number of class hours-theory and practice:	140
Class hours per week:	7
Independent study:	40
Course modality:	Face-to-face instruction
Module level:	Second semester
Core/elective module:	Core
Curricular area:	ACFB Basic
UANL credit points:	6
Create date:	August 28, 2017
Date of last amendment made:	December 22, 2023
Person(s) responsible for the design	Dr. Gilberto Jaramillo Rangel, Dra. Marta G. Ortega Martínez

and amendment of the module:	

2. Presentation:

The Morphological Sciences Unit is scheduled for the second semester and is specifically designed to contribute to the profile of the Clinical Chemistry by integrating in one semester the morphological knowledge from three areas of science (Embryology, Histology, and Anatomy), which are essential for sample handling and for underpinning clinical laboratory procedures.

It is organized into three phases that follow a sequence based on the evolution of biological organization levels. In the first phase, the embryonic origin of the human body is reviewed, from the formation of germ cells or gametes and their role in the fertilization process to the early development processes that give rise to a new being. This will allow students to identify the most common assisted fertilization procedures, which represent an important job market for a Clinical Chemistry in our field, and relate this knowledge to the analytical procedures for determining genetic anomalies.

In the second phase, early developmental stages are related to the origin of tissues, which are listed and classified according to their morphological characteristics. The skill to identify and describe the different types of tissues that constitute organs in normal conditions is developed, using the appropriate terminology. This will be a crucial tool for preparing laboratory findings reports.

In the third phase, the different organs that are part of the systems are distinguished, and their relation to the origin of clinical laboratory samples is established. The organs are located in the body, and their particular characteristics are identified, which can be used to determine the sample collection sites. Finally, the student will be able to prepare an essay integrating Morphological Sciences for developing a clinical laboratory procedure.

3. Purpose(s):

This learning unit (LU) aims to foster both professional and human development in students through the integration of knowledge in three closely related scientific areas. It promotes the development of competencies to recognize the embryonic processes involved in assisted fertilization procedures, while also considering bioethical principles. Additionally, it aims to help students understand the general organization of the human body and handle information for determining appropriate sites for biological sample collection, enabling them to perform this task with precision and safety. Furthermore, students will acquire the foundational knowledge to justify and substantiate laboratory procedures according to the types of samples. Regarding general competencies, students will be able to use their native language effectively in both oral and written forms

to explain embryonic processes and describe histological images in an organized and clear manner, employing relevant, timely, and ethical terminology, and adapting their message to the context to convey their ideas. They will also develop an attitude of commitment and respect, showing acceptance towards diverse social and cultural practices, which affirms the principle of integration when resolving bibliographic research tasks in teams and being evaluated by their peers. Additionally, they will achieve the adaptability required for social and professional environments by working in different situations during their individual practical laboratory work.
During the LU, students will also develop specific competencies as they execute biological procedures to obtain, manage, store, and analyze samples, contributing to diagnoses while ensuring safety.
The Morphological Sciences LU utilizes competencies acquired in the Cellular Biology LU, applying knowledge of cellular structure and function to the organization of tissues and organs. It also relates to the Medical Physiology LU by applying knowledge of structural organization to the function of various organs and systems, and to the Pathology and Clinical Pathology LUs by providing normal parameters to determine cellular and tissue changes in disease situations.

4. Competences of the graduate profile:

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

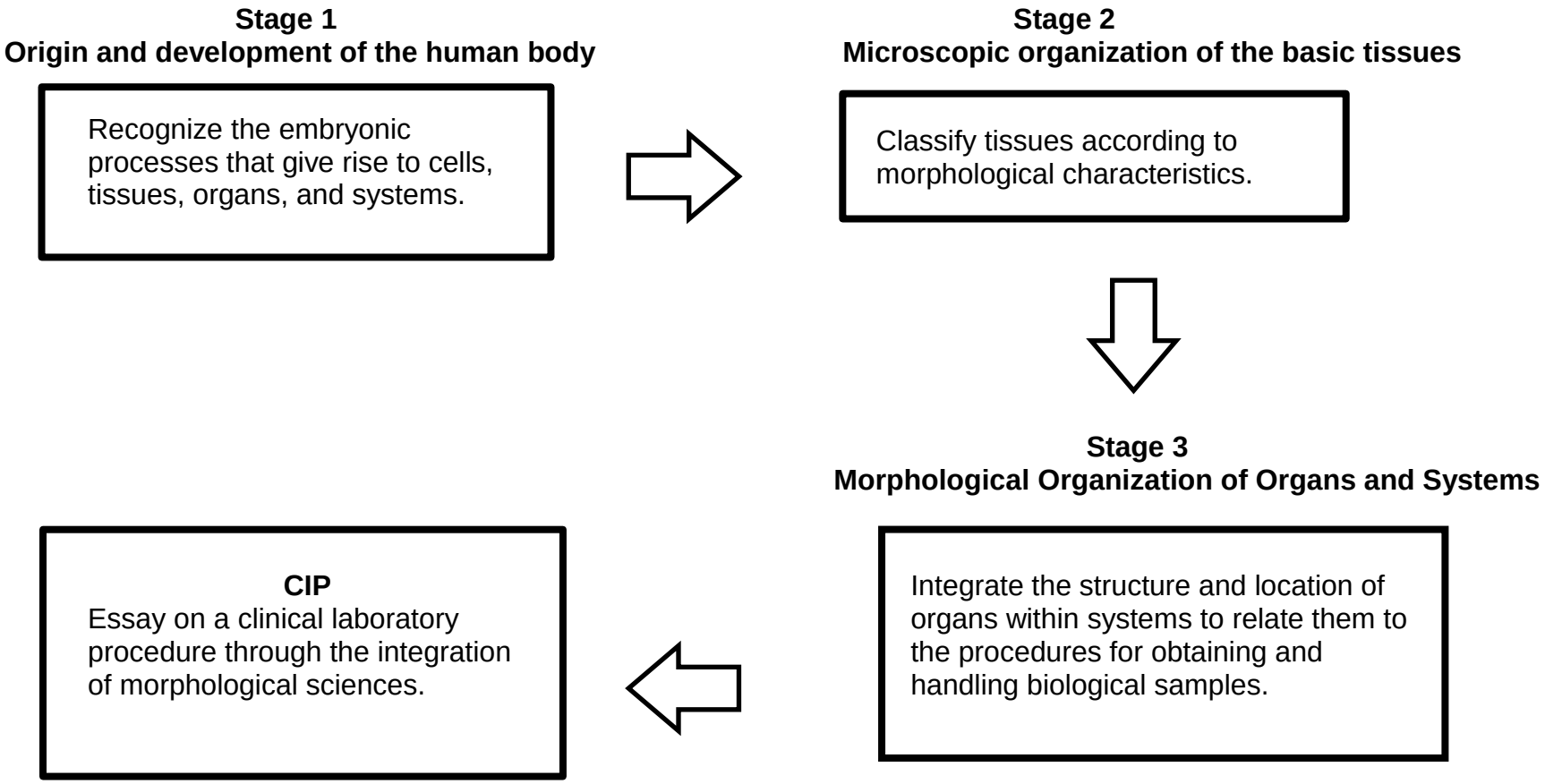
- *Instrumental skills:*
  4. To master their mother tongue orally and in writing with correctness, relevance, timeliness and ethics, adapting their message to the situation or context, for the transmission of ideas and scientific findings.
- *Personal and social interaction skills:*
  9. To maintain an attitude of commitment and respect towards the diversity of social and cultural practices that reaffirm the principle of integration in the local, national and international context in order to promote environments of peaceful coexistence.
- *Integrative skills:*
  15. To achieve the adaptability required by the uncertain social and professional environments of our time to create better living conditions.

Specific competencies 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.

5. Course roadmap:



6. Structuring into stages or phases:

Stage 1: Origin and development of the human body

Competency element(s): Explain the processes of fertilization and early human development to relate them to the origin of body structures, as well as genetic and developmental diseases.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
1. Objective test on early human development and its study methods	The student individually completes the knowledge exam on the content related to Stage 1 on the date and time set by the instructor.	The professor outlines the course through electronic presentations during the session. The student performs a diagnostic activity at the beginning of the stage. For each theoretical session, the student completes a prior reading of the relevant topic. The professor leads the discussion on the day's topic during each theoretical session.	1.1 Female and male gametogenesis 1.2 Menstrual cycle 1.3 Fertilization and assisted fertilization 1.4 Segmentation 1.5 Implantation 1.6 Embryonic processes during the second week 1.7 Embryonic processes during the third week 1.8 Embryonic processes during the fourth week 1.9 Factors that affect embryonic development and teratology	Computer equipment with Microsoft Office and internet connection. MS Teams and Moodle platforms. Electronic presentations prepared by the professor. Bibliographic material: Dudeck, 2016 Langman, 2016 Laboratory manual.

		The professor leads a group debate on the topic of the session. The student actively participates in the debate on the topic during the session. The professor concludes the session with a summary. The professor explains the rationale and procedure for the laboratory practices through electronic presentations. He/she also explains the objectives and purposes of these practices. The student reviews and analyzes the content for each laboratory practice beforehand. In teams, the students observe and analyze the practices under the	1.10 Prenatal study methods Practical Activity 1: Terminology for morphological description Practical Activity 2: Gametogenesis	Videos of early human development events provided by the professor. Teaching laboratory for practices.

		guidance of the professor. Individually, the student prepares a report on laboratory practices 1-2. The report is submitted on the date set by the professor **(Accredited activity 1.1).** The professor evaluates the reports and provides the corresponding feedback.		

Stage 2: Microscopic organization of basic tissues
Competency element(s): Classify tissues based on their microscopic morphology and location to relate them to the origin and characteristics of biological samples.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
2. Comparative Table of Basic Tissues	Individually prepare a comparative table that: • Include the basic tissues reviewed in the stage content: epithelial, connective, muscular, and nervous. • Submit by the scheduled date • Prepare by hand. • Submit in the format provided on the platform.	The student performs a diagnostic activity at the beginning of the stage. For each theoretical session, the student does a pre-reading of the relevant topic. The professor, in theoretical sessions, uses electronic presentations to guide the analysis of the general characteristics of each basic tissue, including its embryonic origin, location, function, and classification.	2.1 General Characteristics of Tissues. 2.2 Classification of Basic Tissues. 2.3 Epithelial Tissue * General Characteristics * Embryonic Origin * Location and Function * Classification 2.4 Connective Tissue * General Characteristics	Computer equipment with Microsoft Office and internet connection. MS Teams and Moodle platforms. Electronic presentations prepared by the professor. Bibliographic material: Pawlina,

	• Present with correct spelling. • Include a cover page. • Include at least five references from formal sources in APA format.	The student actively participates in the theoretical sessions by analyzing the content for each session. The professor leads a group discussion on the session's topic. The student actively participates in the discussion of the session's topic. The professor concludes the session with a summary. In the session, the professor explains the rationale and procedures for the laboratory practices through electronic presentations. The professor also explains the objectives	* Embryonic Origin * Location and Function * Classification * Specialized Connective Tissues 2.5 Muscular Tissue * General Characteristics * Embryonic Origin * Location and Function * Classification 2.6 Nervous Tissue * General Characteristics * Embryonic Origin * Location and Function * Classification Practical Activity 3: Epithelial Tissues	Ross, 2015; Junqueira, 2013. Practice manual. Multimedia Histology Atlas. Format and checklist for descriptions. Comparison table format for the four basic tissues. Histological collections.

		and purposes of the practices. For each laboratory practice, the student reviews and analyzes the content in advance. In teams, the students observe and analyze the practices under the guidance of the professor. Individually, the student prepares a report on laboratory practices 3-10 and submits it by the deadline set by the professor **(Accredited activity 2.1**). The professor evaluates the reports and provides the corresponding feedback.	Practical Activities 4 and 5: General Connective Tissues and Adipose Tissue Practical Activities 6 and 7: Cartilaginous Tissue and Bone Tissue Practical Activity 8: Blood Tissue Practical Activity 9: Muscular Tissue Practical Activity 10: Nervous Tissue	

Stage 3: Morphological organization of organs and systems.
Competency Element(s): Distinguish the structural characteristics of the organs that make up the normal bodily and systems in order to relate them to the procedures for obtaining and handling biological samples for clinical analysis.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
3. Case Study Report on Laboratory Procedures	In teams , prepare a report on the corresponding case that: • Present orally during the theoretical session, on the date and time specified by the professor. • Submit in the format provided on the platform. • Submit in writing (word processor) by the scheduled date.	The student conducts a diagnostic assessment at the beginning of the stage. The student performs prior reading of the topic for each theoretical session. In theoretical sessions, the professor leads the review of the morphological organization of the various body organs and systems and guides the discussion on the characteristics considered for determining sampling	3.1 Circulatory System 3.2 Urinary System 3.3 Digestive System 3.4 Respiratory System 3.5 Endocrine System 3.6 Female Reproductive System 3.7 Male Reproductive System 3.8 Integumentary System For each system include the following: * Embryonic origin * Macroscopic anatomy * Microscopic anatomy * Morphofunctional characteristics * Procedures for obtaining and handling biological samples in the laboratory	Computer equipment with Microsoft Office and internet connection. MS Teams and Moodle platforms. Electronic presentations prepared by the professor. Bibliographic material: Alcaraz del Rio, 2016; Pawlina, 2015; Junqueira, 2013; Ruiz Arguelles, 2017. Practice manual.

	• Submit in the format provided on the platform. • Demonstrates good spelling. • Includes a cover page. • Includes at least five references from formal sources in APA format. .	sites and handling them to obtain a diagnosis. The professor leads a group debate on the session's topic. The student actively participates in the debate on the session's topic. The professor concludes the session with a summary. During the session, the professor assigns each team a case related to an organ or system and provides a mentor to guide them in integrating the necessary knowledge to solve it, as well as in preparing for the oral and written presentation. The students, working in teams and asynchronously, conduct a literature search in various sources of data	Practical Activity 11: Circulatory System Practical Activity 12: Urinary System Practical Activity 13: Digestive System Practical Activity 14: Respiratory System Practical Activity 15: Female Reproductive System and Male Reproductive System	Multimedia histology atlas. Checklist for preparing the written report related to the case resolution. Checklist for the oral presentation of the case by the team. Histological collections.

		that can be applied to solve the assigned case. The mentor professor guides the team in the information search and provides feedback during the session. The professor explains the basis and procedure of laboratory practices through electronic presentations. Additionally, the professor explains the objectives and purposes of the practices. The student reviews and analyzes the content of each laboratory practice in advance. The student, in a team, observes and analyzes the practices under the guidance of the professor.		

		The student individually prepares a report on laboratory practices 11-15 and submits it by the date set by the professor **(Accredited activity 3.1)**. At the end of the phase, the student individually presents a written conceptual map of the phase's content, which is submitted by the date set and in the format indicated by the professor **(Accredited activity 3.2)**.		

7. Summative evaluation:

Stage		
1	**Evidence 1. Objective test on early human development and its study methods**	15%
	Accredited activity 1.1	10%
2	**Evidence 2. Comparative Table of Basic Tissues**	5%
	Accredited activity 2.1	10%
3	**Evidence 3. Case Study Report on Laboratory Procedures**	10%
	Accredited activity 3.1	10 %
	Accredited activity 3.2	5%
CIP	Course integrative project/product: Essay on a Clinical Laboratory Procedure through the Integration of Knowledge from Morphological Sciences	35 %
	Total	100%

8. Course integrative project/product:

Essay on a clinical laboratory procedure through the integration of knowledge from Morphological Sciences.

9. References:

Alcaraz del R. (2016). *Elementos de Anatomía Humana* (Decimoquinta ed.). México: Méndez Editores.

Dudeck, R. (2016). *Embriología* (Sexta ed.). China: Wolters Kluwer.

Junqueira, L. y. (2013). *Histología Básica, Texto y Atlas* (Doceava ed.). China: Panamericana.

Lonrenz, A. (19 de septiembre de 2017). Cells, Tissues, Organs. Basel, Switzerland.

Pawlina, W. M. (2015). *Ros:Histología. Texto Atlas* (Séptima ed.). España: Wolters Kluwer.

Ruiz Arguelles, G. y. (2017). *Fundamentos de Interpretación Clínica de los exámenes de laboratorio* (Tercera ed.). España: Médica-Panamericana.

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Universidad de Illinois (2017) Internet Atlas of Histology, College of Medicine Universidad de Illinois at E.E.U.U. Recuperado el 19 de sept. de 2017 at: https:7histolife.illinois.edu/histo/atlas/showcat