

1. Identification data:	
Institution name:	Universidad Autónoma de Nuevo León
Dependency name:	School of Medicine
Name of the educational program:	Clinical Chemist
Learning unit name:	medical physiology
Classroom-theory and/or practical hours, total:	100 hours
Classroom frequencies per week:	5 hours
Extra classroom hours, total: 20 hours	20 hours
Modality type: Mixed	Mixed
Type of academic period: Third semester	Third semester
Learning unit type: Mandatory	Mandatory
Curricular area: ACFB	ACFB
UANL Credits: 4 credits	4 credits
Production date	09/28/2017
Last update date: 06/30/2023	06/30/2023
Responsible for design and updating	Dr. C. Marlene Marisol Perales Quintana

2. Presentation:

The Medical Physiology learning unit provides the scientific foundations in the area of human health, allowing the student to understand the dynamic processes to maintain the normal functioning of the human body, through guided learning through 4 stages. In the initial stage, the basic concepts for understanding the proper functioning of the human body will be reviewed: functional compartments, homeostasis and regulatory mechanisms; so that in this way the student is able to understand the distribution and electrochemical and water transport that will allow him to identify the regulatory processes at the cellular level. After this stage, 3 more stages will be studied where the specific systems that participate in the regulation of body functions (Stage 2), the fluid and transport system (Stage 3) and maintenance and exchange with the environment (Stage 4), in each stage the functional components that make it up will be distinguished, their contribution to the homeostatic process and the basic methods for functional exploration in health states will be identified. Finally, a case resolution document will be made that demonstrates the acquisition of the fundamentals that explain the proper functioning of the human body in a comprehensive manner.

3. Purpose(s):

The purpose of this learning unit (UA) is to provide the scientific bases in the field of human health through the study of the mechanisms and dynamic processes that allow maintaining the proper functioning of the human body, with the purpose of understanding the bases of clinical laboratory tests.

Regarding general skills, during this learning unit the student will be able to logically and critically analyze homeostatic processes, with perspectives to support the selection of the various analytes for the evaluation of various pathologies. Furthermore, through the knowledge acquired regarding physiological mechanisms, you will be able to critically analyze the basic theories that attempt to explain health-disease processes, which affect the generation of initiatives for health care according to reality. regional and global that allow sustainable development. During the UA the student also develops specific skills, because it will justify the use of identification and/or quantification of different biological molecules based on the physiological and homeostatic principles that regulate the processes of

health-illness. Likewise, you will develop critical thinking for the verification and correlation of analysis results in clinical diagnosis based on the physiological context evaluated.

Within the learning units of previous semesters, there is a relationship with Cellular Biology because the understanding of the smallest level of organization allows us to illustrate the concept of functional compartments in the human body; with Morphological Sciences by correlating the structures of organs for the integration of functional systems and Physics by providing the theoretical bases for the understanding of the different homeostatic processes. Furthermore, this learning unit provides fundamental bases for the understanding of Biochemistry because the knowledge acquired of the various physiological processes allows us to describe the metabolic routes of different basic molecular pathways. In Pathology you will apply the bases of the normal functioning mechanisms of the organism to infer adaptive responses to abnormal stimuli. Furthermore, in clinical pathology, the understanding of homeostatic processes allows the selection of appropriate laboratory tests for diagnosis.

4. Graduation profile competencies:

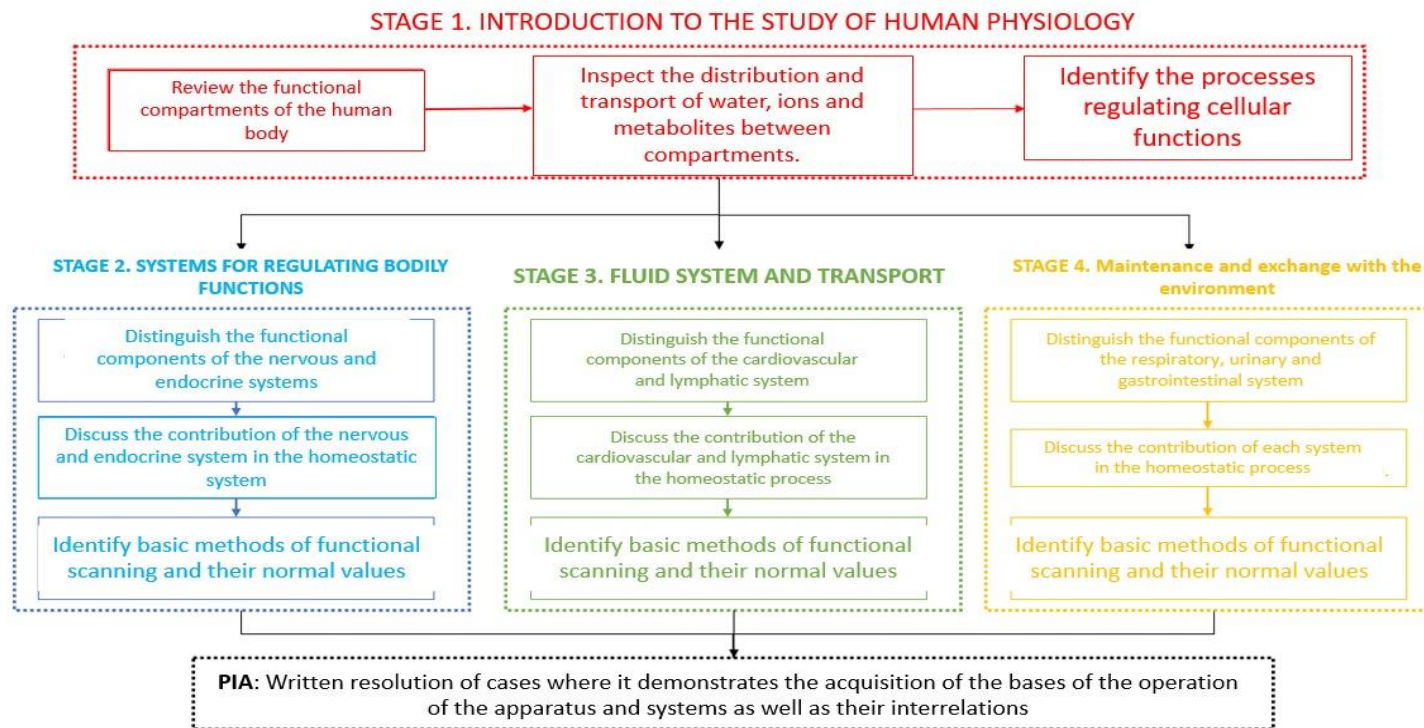
General competencies to which this learning unit contributes:

- *To use logical, critical, creative and proactive thinking to analyze natural and social phenomena that allow them to make relevant decisions in their sphere of influence with social responsibility.*
- *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.*
- To make innovative proposals based on a holistic understanding of reality to help overcome the challenges of the interdependent global environment.

Specific competencies of the graduation profile to which the learning unit contributes:

- 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.
- 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. Graphic representation



6. Structuring in stages or phases:

Stage 1: Introduction to the study of Human Physiology:

Element(s) of competence: Identify the homeostatic process and the integration of basic cellular functions in the mechanisms of self-regulation and interaction with the internal and external environment for the understanding of the health process. disease.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
1. Phase 1 knowledge test.	<ul style="list-style-type: none"> •Solve individually on the date and time established by the teacher. 	<ul style="list-style-type: none"> - The teacher, with the support of a presentation, frames the content of the UA. - The student reads the bibliographic material prior to the class session. - During the session, a discussion forum is held regarding the development of Physiology as a science and its main concepts. - Students in collaborative work identify the components of the homeostatic mechanism of cases and present 	<ol style="list-style-type: none"> 1. Homeostasis <ul style="list-style-type: none"> - Control systems - feedback Circuits 2. Internal environment and compartments <ul style="list-style-type: none"> - Composition of the internal environment - Composition of body fluids - Electrolyte composition - Composition of organic molecules 3. Regulation of cellular functions <ul style="list-style-type: none"> - Membrane potential and electrical excitation - Specific ligands and receptors 4. Second messengers 	<p>Case sheets for class work.</p> <p>Laboratory manual.</p> <p>Computer with Microsoft office and internet connection.</p> <p>Moodle Platform Microsoft Teams and Microsoft Forms platform</p> <p>Other digital resources: such as Canva or Genially</p> <p>Suggested videos in the “Sources of support and consultation” section.</p>

		<p>them in a discussion forum.</p> <ul style="list-style-type: none"> - The student individually solves cases about the movement of liquids through the compartments and they are presented in academic doubt forums. - The student collaboratively performs Practice 1 "Osmosis", Practice 2 "Variation in the volume and osmolarity of the LEC" and Practice 3 "Diffusion" (<i>weighted activity 1.1</i>) and submits a report in Microsoft Forms. 		<p>Bibliographic material: Human Physiology, Sutart Ira Fox. Chapter 1, 6, 7</p>
--	--	--	--	--

Stage 2: Regulatory systems of body functions

Competency element: Explain the function of the nervous system (SN) and endocrine system in health conditions, so that through inference you are able to base the selection of basic methods for its functional exploration.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
2. Worksheets in class.	<ul style="list-style-type: none"> Respond in writing and deliver at the end of each session. Solve individually 	<ul style="list-style-type: none"> The teacher, with the support of a Power Point presentation, frames the phase. Prior to each session, the student reads to understand the bibliographic material. During the SN sessions, a discussion forum is held about the content of the session. The student issues conclusions from the debate. The student collaboratively carries out the practical activities and submits a report (<i>Weighted activity 2.1</i>): o Practice 4: Action potential. 	<ol style="list-style-type: none"> Nervous System <ul style="list-style-type: none"> Nervous system cells Central and Autonomous Nervous System Physiology of senses Efferent division Basic methods and reference values for functional CSF examination. Endocrine system <ul style="list-style-type: none"> Hormones Hormones classification Hormonal action mechanisms Hypothalamic-pituitary axis 	<p>Laboratory manual.</p> <p>Computer with Microsoft office and internet connection.</p> <p>Microsoft Teams and Microsoft Forms platform</p> <p>ExamSoft Platform</p> <p>Moodle Platform</p> <p>Suggested videos in the "Sources of support and consultation" section.</p> <p>Bibliographic material: Human Physiology, Sutart</p>

		<ul style="list-style-type: none"> ○ Practice 5: Chemical synapse ○ Practice 6: Somatic Sensitivity ○ Practice 7: Senses ○ Practice 7: Chemicals senses ○ Practice 8: Vision ○ Practice 9: Hearing ○ Practice 10: Vestibular apparatus <p>Nervous System knowledge exam (weighted activity 2.2)</p> <ul style="list-style-type: none"> - During the endocrine sessions, students present in teams the characteristics of each hormone. - The student collaboratively carries out the practical activities and sends a report through the Microsoft Forms platform (Weighted activity 2.3): <ul style="list-style-type: none"> ○ Practice 11: Hormone growth and acromegaly ○ Practice 12: Thyroid hormones ○ Practice 13: HCG Detection 	<ul style="list-style-type: none"> - Hormones from the Anterior Lobe of the Pituitary - Thyroid Hormones - The endocrine pancreas - Hormones of the adrenal gland - Parathyroid hormone - Vitamin D - Calcitonin - Male hormones - Female hormones - Other organs with endocrine function: kidney, heart, endothelium and adipocyte. - Basic methods and reference values of the exploration of hormonal function. 	Ira Fox. Chapter 8, 9, 10, 11, 12, 19 and 20.
--	--	---	---	---

		<ul style="list-style-type: none"> ○ Practice 14: Glucose tolerance curve -Endocrine System knowledge exam (Weighted activity 2.4) 		
--	--	--	--	--

Stage 3: Fluid and transport systems

Competency element: Explain the function of the cardiovascular and immune system in health conditions, so that through inference you are able to base the selection of basic methods for its functional exploration.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
3. Written case resolution report regarding the function of the different components of blood, blood vessels and electrical activity of the heart, as well as the activity of cells, antigens and antibodies.	<ul style="list-style-type: none"> Respond in writing in a timely manner. Solve individually It is presented on the date and time established by the teacher. It develops in a period of 1 hour. 	<ul style="list-style-type: none"> The teacher, with the support of a Power Point presentation, frames the phase. Before each session, the student reads understanding of bibliographic material. The student analyzes the results of a biochemical profile and a blood count, in a forum of discussion the role of each of the elements reported in said analyzes is discussed. Students hold a group discussion forum on the 	<ol style="list-style-type: none"> Composition of blood <ul style="list-style-type: none"> Plasma Formed elements of blood Antigens erythrocytes Blood coagulation Heart Structure <ul style="list-style-type: none"> Pulmonary and general circulations Atrioventricular and semilunar valves Cardiac cycle. Blood vessels <ul style="list-style-type: none"> Blood pressure Exchange in the capillaries Distribution of blood to tissues The immune system <ul style="list-style-type: none"> Defense mechanisms Active and passive immunity Functions of T and B lymphocytes 	<p>Laboratory manual.</p> <p>Computer with Microsoft office and internet connection.</p> <p>Microsoft Teams and Microsoft Forms platform</p> <p>ExamSoft Platform Moodle Platform Suggested videos in the "Sources of support and consultation" section.</p> <p>Bibliographic material: Human Physiology, Sutart Ira Fox. Chapter 13, 14, 15</p>

		<p>structure and function of the heart.</p> <ul style="list-style-type: none"> - The student performs Collaborate practical activities and send reports (Weighted activity 3.1): <ul style="list-style-type: none"> o Practice 15: Blood groups o Practice 16: Hemostasis o Practice 17: Blood pressure - The student performs collaborative a conceptual map of the immune system (weighted activity 3.2) which delivers physically in the Department of Physiology on the date and time established by the professor. 	<p>5. lymphatic system 6. Basic methods of functional exploration of the cardiovascular system and normal parameters.</p>	
--	--	---	---	--

Stage 4: Maintenance and exchange with the environment

Competency element: Explain the function of the respiratory, urinary and gastrointestinal system in health conditions, so that through inference you are able to base the selection of basic methods for its functional exploration.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
4. 4. Worksheets in class	<ul style="list-style-type: none"> Respond in writing and deliver at the end of each session 	<ul style="list-style-type: none"> The teacher, with the support of a presentation, frames the phase. Prior to each session, the student reads to understand the bibliographic material. During the respiratory system sessions, a discussion forum is held about the content of the session. The student collaboratively carries out the practical activities and sends a report through the Microsoft Forms 	<p>7. Respiratory system</p> <ul style="list-style-type: none"> Mechanics of the breathing Ventilation Gas exchange in the lungs and tissues Transport of gases in the blood Ventilation regulation Basic methods of functional exploration <p>8. Urinary System -</p> <ul style="list-style-type: none"> Overview of kidney function Filtration Reabsorption Secretion Excretion Urination Basic methods of functional exploration 	<p>Laboratory manual.</p> <p>Computer with Microsoft office and internet connection.</p> <p>Microsoft Teams and Microsoft Forms platform</p> <p>ExamSoft Platform</p> <p>Moodle Platform</p> <p>Suggested videos in the "Sources of support and consultation" section.</p> <p>Bibliographic material: Human Physiology, Sutart</p>

		<p>platform (Weighted activity 4.1):</p> <ul style="list-style-type: none"> ○ Practice 18: Breathing Mechanics ○ Practice 19: Lung volumes and capacities ○ Práctica 20: Breathing <p>-Respiratory System knowledge exam (Weighted activity 4.2)</p> <ul style="list-style-type: none"> - During the renal system and acid-base balance sessions, a discussion forum is held about the content of the session. - The student collaboratively carries out the practical activities and sends a report through the Microsoft Forms platform (Weighted activity 4.3): ○ Practice 21: Aqueous and osmotic diuresis - Renal System and acid-base balance knowledge 	<p>9. Gastrointestinal system</p> <ul style="list-style-type: none"> - Motility - Secretion - Digestion and absorption - Function regulation gastrointestinal - Basic methods of functional exploration 	<p>Ira Fox. Chapter 16, 17, 18</p>
--	--	--	--	------------------------------------

		<p>exam (Weighted activity 4.4)</p> <ul style="list-style-type: none"> - During apparatus sessions gastrointestinal discussion forum is held on the content of the session - The student makes a flow diagram that explains the obtaining of nutrients through the gastrointestinal system. (Weighted activity 4.5) and deliver it to the Physiology department on the date and time established by the teacher. - Knowledge of the gastrointestinal system <p>Exam (weighted activity 4.6)</p>		
--	--	--	--	--

7. Comprehensive evaluation of processes and products

Stage 1	Evidence of Learning 1: Phase 1 Knowledge Test	7.0%
	Weighted activity 1.1 (Practices 1 to 3)	2.0%
Stage 2	Evidence of Learning 2: Class Worksheets	6.0%
	Weighted activity 2.1 (Practices 4 to 10)	2.0%
	Weighted activity 2.2 (Nervous System knowledge exam)	7.0%
	Weighted activity 2.3 (Practices 11 to 14)	2.0%
	Weighted activity 2.4 (Endocrine System knowledge exam)	7.0%
Stage 3	Learning evidence 3: "Written cases: cardiovascular and immunological system"	7.0%
	Weighted activity 3.1 (Practices 15 to 17)	2.0%
	Weighted activity 3.2 (Immune system conceptual map)	1.0%
Stage 4	Evidence of learning 4: "In-class worksheets"	6.0%
	Weighted activity 4.1 (Practices 18 to 20)	2.0%
	Weighted activity 4.2 Respiratory system knowledge exam	7.0%
	Weighted activity 4.3 (Practice 21)	2.0%
	Weighted activity 4.4 Renal system and acid-base balance knowledge exam	7.0%
	Weighted activity 4.5 (Gastrointestinal System Diagram)	2.0%
	Weighted activity 4.6 Gastrointestinal System knowledge exam.	7.0%
Integrative learning product		24.0%
Total		100.0%

8. Integrative learning product:

Writing on the resolution of cases on the physical, chemical and biological foundations of the functioning of the devices and systems of the human body, as well as their interrelationships.

9. Sources of support and consultation:

Silverthorn, D.U., & Johnson, B.R. (2019). Human physiology: an integrated approach: Editorial Médica Panamericana. Fox, S. I. (2014). Fisiología humana (13a. ed.): McGraw Hill Mexico.

Garza, N. E. F. (2008). Physiology laboratory manual: McGraw-Hill. Raff, H., & Levitzky, M. G. (2012). Medical Physiology - 1ed: McGraw Hill Brasil. The American Physiological Society. (2017). Physiological Reviews. Recovered the 05 of March of 2017, of <http://physrev.physiology.org/> Cell biology videoconferences. Retrieved on September 5, 2017, from: www.dnatube.com

PHASE 1.

- Crash Course (January 6, 2015) Introduction to Anatomy & Physiology: Crash Course A&P #1. [Video File]. Youtube. <https://www.youtube.com/watch?v=uBGI2BujkPQ&list=PL2vrmieg9tO1TE2BEft0UWG6lkMYCWXY>.

PHASE 2.

- Crash Course (2 de Marzo 2015) The Nervous System, Part 2 - Action! Potential!: Crash Course A&P #9. [Archivo de Vídeo]. Youtube. https://www.youtube.com/watch?v=OZG8M_IdA1M&list=PL2vrmieg9tO1TE2BEft0UWG6lkMYCWXY&index=8
- Forciea, B. (sf). Neurological Exam Virtual Lab. <https://www.drborciea.com/Captivate/Neuroexam/index.html>. Retrieved July 20, 2020, from <https://www.drborciea.com/Captivate/Neuroexam/index.html>

PHASE 3.

- Crash Course (22 de Junio 2015) Endocrine System, Part 1 - Glands & Hormones: Crash Course A&P #23. [Archivo de Vídeo]. Youtube.
<https://www.youtube.com/watch?v=eWHH9je2zG4&list=PL2vrmieg9tO1TE2BEft0UWG6IkMYCWXY&index=21>
- Barclay, T. (s. f.). *Endocrine System: Discover the Anatomy and Function of Glands*. Innerbody. Recuperado 20 de julio de 2020, de <https://www.innerbody.com/image/endoov.html>
- *Hormones that act on the kidneys*. (s. f.). <http://www.people.vcu.edu/~elmmiles/hormones/>. Recuperado 20 de julio de 2020, de <http://www.people.vcu.edu/%7Eelmmiles/hormones/>

PHASE 4.

- Crash Course (06 de Julio 2015) The Heart, Part 1 - Under Pressure: Crash Course A&P #25 [Archivo de Vídeo]. Youtube.
<https://www.youtube.com/watch?v=X9ZZ6tcxArl>

PHASE 5.

- Crash Course (12 de Octubre 2015) Sistema Urinario, parte 1: Crash Course A&P #38 [Archivo de Vídeo]. Youtube.
<https://www.youtube.com/watch?v=l128tW1H5a8>
- Crash Course (24 Agosto 2015) Respiratory System, Part 1: Crash Course A&P #3 [Archivo de Vídeo]. Youtube.
<https://www.youtube.com/watch?v=bHZsvBdUC2I>
- Crash Course (07 de Septiembre 2015) Digestive System, Part 1: Crash Course A&P #33 [Archivo de Vídeo]. Youtube.
<https://www.youtube.com/watch?v=yloTRGfcMqM>

