UANL
UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN

FACULTAD DE MEDICINA

MODULE DESCRIPTION (ANALYTICAL PROGRAM).

1. Module Information Code:	
• Name of the Institution and School	Universidad Autónoma de Nuevo León, School of Medicine
• Name of the Learning Unit	Tissue and Cell Biology.
• Total classroom hours for theory and/or practice.	127 hours.
• Total extra classroom hours	83 hours.
• Course Modality	Schooled.
• Type of academic period in which the module is offered	2nd Semester.
• Type of Learning Unit in the Curriculum	Compulsory.
• Curriculum area:	ACFB.
• UANL credit points	7
• Date of module creation:	March 5, 2015.
• Date of last amendment:	January 25, 2021.
• Person(s) responsible for the module design and amendments:	Dra. María de Jesús Loera Arias. / Dr. Roberto Montes de Oca Luna.

2. Introduction.

Tissue and Cell Biology studies the normal morphological structure of cells, tissues and organs of the human body, correlating it with their function.

The course comprises four stages: in the first stage the knowledge of the tools necessary for the study of cells and tissues is acquired; in the second stage the structure and function of the cell and the extracellular matrix is studied; in the third stage the structure and function of the basic and specialized tissues are studied; this serves as a basis in the fourth stage for the study of the organs that form the systems of the human body.

In the second, third and fourth stages, clinical cases will be solved for the application of morphological and functional concepts, as a strategy for knowledge integration. At the end of the course the student will deliver a Learning Integration Product (LIP) that will allow for a trial on the

morphological and functional study of a subject as well as the resolution of clinical cases to integrate the knowledge acquired throughout the course.

3. Purpose(s)

The Tissue and Cell Biology learning unit contributes to the acquisition of the graduate profile by knowing the structure and function of the human body and thus understanding the most common diseases that a doctor faces in first level care. During this unit, moral and ethical values are instilled, as well as the importance of research in the generation of knowledge. Also, the structure, organization, function and location of cells, tissues, organs and systems that integrate the human being in a normal way are analyzed; this knowledge serves as a basis for the understanding of Anatomy,

Physiology, Developmental Biology, Pathology, Pharmacology, Genetics, Gastroenterology, Surgery, Endocrinology, Dermatology, Hematology, Cardiology, Nephrology, Pediatrics, Pneumology, Rheumatology, Allergology, Infectology and Neurology.

This learning unit is related to the general competences through the development of exercises previous to the discussion of the topic, search of information and use of different technological and communication tools. With the discussion of the corresponding topic, logical, formal, verbal and non-verbal language is practiced, facilitating the understanding and expression of ideas. In addition, the students are trained in teamwork and personal development in values such as responsibility, respect and honesty.

With respect to specific competencies, it provides the student with the knowledge, skills and attitudes necessary for the holistic understanding of the human being, through scientific knowledge of the structure and normal functioning of the human body, which allows him/her to understand the alterations of the molecular, biochemical and cellular mechanisms that occur in diseases. Through the methodology employed, the development of critical and scientific thinking is promoted.

4. Competences of the graduate profile.

a. General competences contributing to this learning unit.

Instrumental skills:

1. Apply autonomous learning strategies in the different levels and fields of knowledge that allow them make appropriate and relevant decisions in the personal, academic and professional fields.

2. Use the logical, formal, mathematical, iconic, verbal and non-verbal languages according to their stage of life, in order to understand, interpret and express ideas, feelings, theories and streams of thinking with an ecumenical focus.

3. Use the information and communication technologies as access tools to information and its transformation in knowledge, as well as for learning and collaborative work with cutting-edge techniques that allow its constructive participation in society.

Personal and social interaction skills

11. Practice the values promoted by the UANL: truth, equality, honesty, liberty, solidarity, respect for life and anyone's, peace, respect for nature, integrity, ethics behavior and justice, within their personal and professional environment in order to make a sustainable society.

Integrative skills

14. Resolve personal and social conflicts in accordance with specific techniques in the academic field and their profession for the proper decision making.

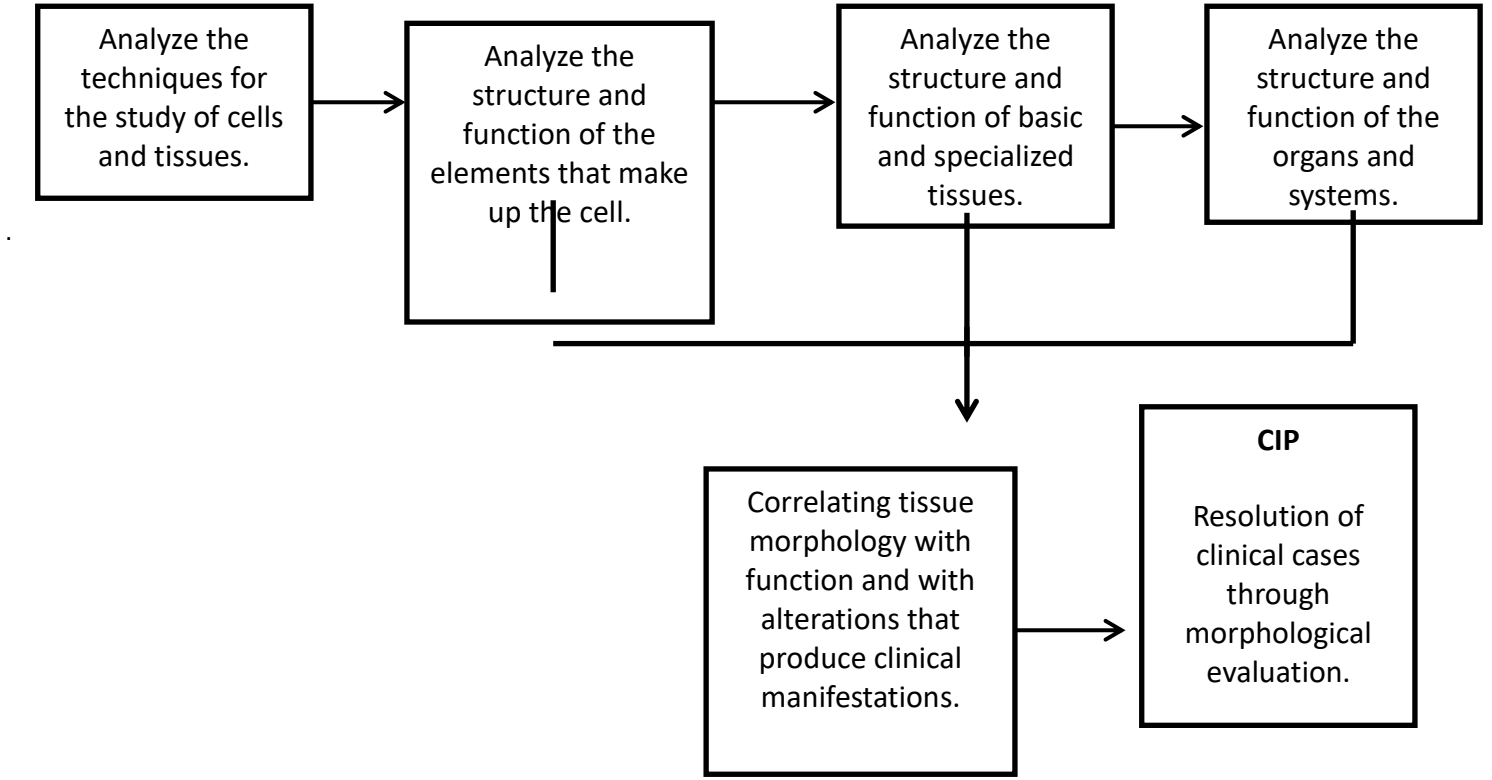
15. Achieve the adaptability required in uncertain professional and social environments of our time to improve living conditions.

b. Specific competences of the graduate profile that contributes to the learning unit.

1.- Use the medicine scientific fundaments considering economical, psychological, social, cultural and environmental factors which contribute to the development and evolution of a disease for decision-making and medical actions.

7.- Applies the scientific method for the resolution of medical problems with an innovative, analytic and self-critical attitude for preventing, diagnosing and treating diseases.

5. Course Roadmap:



6. Structuring into stages or phases

Phase 1. Tools for the study of cells and tissues.

Component(s) of the competence:
Analyze histological procedures by applying microscopy as a study tool that allows the understanding of the structure of cells, tissues and organs of the human body.

Evidence of student learning	Performance Criteria	Learning activities	Contents	Resources
Written report of the laboratory exercises about the techniques used for the study of cells and tissues.	• Correctly uses the terminology used in Tissue and Cell Biology. • Distinguishes the different methods of obtaining samples. • Analyzes the basis of tissues and cell processing techniques. • Correlates the different techniques of observation by electronic and light microscopy with their foundation and applications. • Should be done by hand in a clear and orderly manner. • This is to be done on	**Facilitation activities:** Classroom exposure through questioning as a strategy of participatory methodology; Content analysis through images; Team building for discussion and problem solving on histological procedures for the study of tissues and cells. **Learning activities:** • Participation during the class. • Evaluation of concepts through the resolution of questionnaires. • Concept map on the different biomolecules that form the human body. • Participation during the class. • Reading verification exercises through the	**Conceptual Content:** -Biomolecules -Histological technique. -Exfoliative cytology. -Special observation techniques: -Histochemistry. -Immunohistochemistry. -Cryofracture. -Auto radiography. -Microscopy. -Variations of the light microscope. -Resolution. -Analysis of histological preparations. **Procedural Content:** -Correct identification of the components of the optical microscope. -Analysis of histological preparations using light microscopy. **Attitudinal Content:** -Willingness to work as a team.	School of Medicine classrooms. Laboratories 1, 2 and 3. **Didactic material:** • Textbooks and reference books. • Collection of images in Power point presentation. • Collection of Cellular Biology animations. • Collection of histological preparations. • Platform of the Faculty of Medicine of the UANL. **Laboratory.** • Computer. • Projector. • Clear field light microscopes.

	an individual basis. • Complete information must be included. • Should be delivered on the date indicated by the professor. • Attendance to the corresponding session.	resolution of questions and charts with the most relevant information on the subject. • Written report of laboratory practice on biomolecules and tools for the study of tissues and cells.	-Order and discipline. -Respect for colleagues. -Proper handling of material and microscopes.	

Phase 2. The cell

Component(s) of the competence:
Analyze the morphology and function of cells, subcellular structures and extracellular matrix through the interpretation of images and histological preparations to relate them to the alterations that occur in common diseases.

Evidence of student learning	Performance Criteria	Learning activities	Contents	Resources
Resolution of clinical cases about the cell	• Correctly uses the terminology used in Tissue and Cell Biology. • Has prior knowledge of the subject. • Choose the most relevant data to define the problem. • Attendance to the corresponding session.	**Facilitation activities:** Classroom exposure through questioning as a strategy of participatory methodology; Formation of work teams to discuss the morphology and function of cells, subcellular structures and extracellular matrix. **Learning activities:** • Participation during the class.	**Conceptual Content:** **Cell:** -Cellular membrane -Membrane transport mechanisms -Ribosomes, polyribosomes -Cytoskeleton -Endoplasmic reticulum -Golgi's Apparatus -Protein secretion -Lysosomes -Endosomes, phagosomes, autophagosomes, residual bodies -Peroxisomes -Mitochondria	School of Medicine classrooms. Laboratories 1, 2 and 3. **Didactic material:** • Textbooks and reference books. • Collection of images in Power point presentation. • Collection of Cellular Biology animations. • Collection of histological preparations.

	• Identify the problem(s). • Presents explanations about the cause of the problem. • Easy to make decisions. • Justifies the decision making process. • Correlates the alteration of ion transport across the membrane with cystic fibrosis. • Correlates the alteration of membrane receptors with hypoparathyroidism, dwarfism and type 2 diabetes mellitus. • Correlates hereditary enzyme deficiencies with lysosomal storage diseases. • Correlates enzyme deficiencies in peroxisomes with adrenoleukodystrophy	• Correct identification of tissues and structures through image review. • Reading verification exercises through the resolution of questions and tables with the most relevant information on the subject. • Search report and review of a current scientific article summary on a protein representative of the cell and the extracellular matrix. • Written report of laboratory practice of the components of the cell and the extracellular matrix.	-Inclusions -Core and nucleolus -Cellular cycle -Mechanisms of death **Exctacellular Matrix:** - Fundamental substance -Glucosaminoglycans -Proteoglycans -Bonding glucoproteins -Collagenous fibers -Elastic fibres -Basal membrane -Cellular anchorage to the matrix **Clinical Correlations:** -Mucovisidose. -Diabetes mellitus type 1. -Adrenoleukodystrophy. -Kartagener syndrome. -Pompe diseases. **<u>Procedural Content:</u>** -Analysis of histological preparations using light microscopy. -Identification of subcellular structures. -Correlation of function. -Clinical correlation of subcellular structures -Identify the components of the extracellular matrix. Classify the components of the extracellular matrix. -Correlate the components of the extracellular matrix	• Platform of the Faculty of Medicine of the UANL. **<u>Laboratory.</u>** • Computer. • Projector. • Clear field light microscopes. **<u>Electronic references:</u>** • Blue Histology. • Histology and Virtual Microscopy.

First partial exam.	and Zellweger syndrome. • Correlates the structural disorganization of the cilia with primary ciliary dyskinesia (Kartagener's syndrome). • Correlates the abnormal accumulation of glycogen with von Gierke's, Pompe's and McArdle's diseases. • Correlates DNA alterations with examples of genetic pathologies. • Correlates the alterations of the cell cycle with the development of tumor cells. • It will be done on an individual basis. • Attendance to the corresponding session.		with their normal function. -Correlate the components of the extracellular matrix with the clinical pictures. **<u>Attitudinal Content:</u>** -Adequate handling of didactic material. -Resolution of personal conflicts. -Willingness to work in a team. -Discipline and good behaviour. -Respect for colleagues, instructors and teachers.	

Phase 3. Tissues.

Component(s) of the competence:
Analyze the components and function of tissues through the interpretation of images and histological preparations to relate them to the alterations that occur in common diseases.

Evidence of student learning	Performance Criteria	Learning activities	Contents	Resources
Resolution of clinical cases of the different basic and specialized tissues.	• Correctly uses the terminology used in Tissue and Cell Biology. • Must include in complete form the varieties of each tissue. • Must know the morphological characteristics, location and function of each tissue. • It will be done on an individual basis. • Attendance to the corresponding session. • Has prior knowledge of the subject. • Choose the most relevant data to define	**Facilitation activities:** Classroom exposure through questioning as a strategy of participatory methodology; Formation of work teams to discuss the components and function of tissues and the alterations that occur in common diseases. **Learning activities:** • Participation during the class. • Correct identification of tissues and structures through image review. • Written report that includes the correlation of basic and specialized tissues with their structure, function and location.	**Conceptual Content:** **Basic tissues:** -Epithelial tissue -Conective tissue. -Muscular tissue. -Nervous tissue. **Specialized tissues:** -Cartilaginous tissue -Bone tissue -Blood tissue -Hematopoietic tissue **Clinical Correlations:** -Pemphigus. -Raquitism. -Osteoporosis. -Duchenne dystrophy. -Myasthenia gravis. -Guillain-Barré syndrome -Traumatic section of the peripheral nerve -Diabetic neuropathy. -Anemia. -Spherocytosis. -Sickle cell disease. Rickets. -Osteoporosis. -Duchenne dystrophy.	School of Medicine classrooms. Laboratories 1, 2 and 3. **Didactic material:** • Textbooks and reference books. • Collection of images in Power point presentation. • Collection of Cellular Biology animations. • Collection of histological preparations. • Platform of the Faculty of Medicine of the UANL. **Laboratory.** • Computer. • Projector. • Clear field light microscopes.

	the problem. • Identify the problem(s). • Presents explanations about the cause of the problem. • Easy to make decisions. • Justifies the decision-making process. • Correlates intercellular junctions with pemphigus. • Correlates epithelial cell surface specializations with Kartagener's syndrome. • Correlates epithelial tissue with the development of carcinoma. • Correlates connective tissue disorders with Ehlers-Danlos and Marfan syndromes. • Correlates alterations in bone tissue with		-Myasthenia gravis. -Guillain-Barré syndrome -Traumatic section of the peripheral nerve -Diabetic neuropathy. -Anemia. -Spherocytosis. -Sickle cell disease. **Procedural Content:** -Correct identification of each tissue Correct classification of the tissues. Correlation of the tissues with their normal function. -Correlation of the tissues with clinical pictures. **Attitudinal Content:** -Adequate handling of didactic material. -Resolution of personal conflicts. -Willingness to work in a team. -Discipline and good behaviour. -Respect for colleagues, instructors and teachers.	**Electronic references:** • Blue Histology. • Histology and Virtual Microscopy.

	rickets and osteoporosis. • Correlates the alterations of the muscular tissue with the dystrophies. • Correlates the alterations of the myo-neural junction with myasthenia gravis. • Correlates nerve tissue alterations with multiple sclerosis, Guillain-Barré syndrome, traumatic section of the peripheral nerve and diabetic neuropathy. • Correlates alterations in hemoglobin with anemia. • Correlates the morphological alterations of erythrocytes with spherocytosis and sickle cell disease.			

Phase 4. Organs and systems.

Component(s) of the competence:
Analyze the morphology and function of the organs, structures and cells that make up each system through the interpretation of images and histological preparations to relate them to the alterations that occur in common diseases.

Evidence of student learning	Performance Criteria	Learning activities	Content	Resources
Resolution of clinical cases of the different organs and systems that make up the human body.	• Correctly uses the terminology used in Tissue and Cell Biology. • Must include in complete form the varieties of each tissue. • Must know the morphological characteristics, location and function of each tissue. • It will be done on an individual basis. • Attendance to the corresponding session. • Has prior knowledge of the subject. • Choose the most relevant data to define the problem.	**Facilitation activities:** Classroom exposure through questioning as a strategy of participatory methodology; Content analysis through the projection of images on the morphology and function of the organs, structures and cells that make up each system. -Formation of work teams for the analysis of histological preparations. **Learning activities:** • Participation during the class. • Correct identification of organs and their structures through image review. • Analysis of the organs in histological preparations. • Elaboration of reports with the description of the organs and	**Conceptual Content:** **Special Senses:** Eye, ear. **Circulatory system:** Heart, arteries, veins, lymphatic vessels, microcirculation. **Lymphoid system:** Thymus, lymph nodes, spleen, lymphoid tissue associated with mucous membranes **Respiratory system:** Nasal cavity, para-nasal sinuses, pharynx, larynx, trachea, lung **Endocrine system:** Hypothalamus, epiphysis, pituitary, thyroid, parathyroid, adrenal, diffuse neuroendocrine system cells **Digestive system:** Oral cavity: Lip, tooth, palate, cheek, tongue. Digestive tract: Esophagus, stomach, duodenum, jejunum, ileum, colon, anal canal. Glands attached to the digestive tract: minor salivary glands, parotid, submaxillary, sublingual, pancreas, liver,	School of Medicine classrooms. Laboratories 1, 2 and 3. **Didactic material:** • Textbooks and reference books. • Collection of images in Power point presentation. • Collection of Cellular Biology animations. • Collection of histological preparations. • Platform of the Faculty of Medicine of the UANL. **Laboratory.** • Computer. • Projector. • Clear field light microscopes. **Electronic references:**

	• Identify the problem(s). • Presents explanations about the cause of the problem. • Easy to make decisions. • Justifies the decision-making process. • Identifies organs, structures and/or cells that are related to: epistaxis, sinusitis, bronchitis, bronchiolitis, asthma, pneumonia and chronic obstructive pulmonary disease. • Identifies organs, structures and/or cells that are related to: diabetes insipidus, pituitary tumors and hyperthyroidism, hypothyroidism, hyperparathyroidism, hypoparathyroidism, acromegaly, gigantism and pituitary dwarfism. • Identifies organs,	structures. • Correlation of organs and structures with normal function. • Written report of the different organs and systems that make up the human body.	gall bladder. **Urinary system:** Kidney, ureter, bladder, urethra. **Male reproductive system:** testicle, spermatic cord, prostate and seminal vesicle, penis. **Female reproductive system:** Ovary, oviduct, uterus, cervix and vagina. **Tegumentary system:** Skin, skin attachments. **Clinical Correlations:** -Diabetic Retinopathy. -Bronchitis. -Bronchiolitis. -Asthma. -Pneumonia. -EPOC -Tasteless diabetes. -Prolactinoma. -Acromegaly. -Gigantism. -Pituitary dwarfism. -Hyper and hypothyroidism. -Hyper and hypoparathyroidism. -Cushing's syndrome. -Addison's syndrome. -Dental caries. -Esophagitis and Barret's esophagus -Gastritis, colitis and appendicitis. -Pancreatitis. -Hepatitis. -Cholecystitis.	• Blue Histology. • Histology and Virtual Microscopy.

Second partial exam. **Final exam.**	structures and/or cells that are related to: dental caries, esophagitis, esophageal varices, Barret's esophagus, esophageal cancer, gastritis, colitis, appendicitis, mumps, pleomorphic adenoma of salivary glands, pancreatitis, hepatitis and cholecystitis. • Identifies the organs, structures and/or cells that are related to: pemphigus, acne, nevi, freckles, psoriasis, warts, carcinoma. • Identifies the organs, structures and/or cells that are related to: chronic inflammatory dermopathies and those of allergic origin. • Identifies the organs, structures and/or cells that are related to: diabetic retinopathy. • Identifies the organs, structures and/or cells that are related to: kidney failure.		-Renal insufficiency. -Cervical cancer. -Pemphigus. -Psoriasis. - Warts. **Procedural Content:** -Correct identification of each organ -Correlation of each organ with its normal function. -Correlation of the organs with their clinical manifestations. **Attitudinal Content:** -Adequate handling of didactic material and microscopes. -Willingness to work as a team. -Order and discipline. -Respect for colleagues.	

7. Summative Evaluation

Evidence 1: Resolution of cases 1st partial:	1.25 %
Evidence 2: Resolution of cases 2nd partial:	1.25 %
Evidence 3: Resolution of cases 3rd partial:	1.25 %
Evidence 4: Resolution of cases 4th partial:	1.25 %
Workbook:	5 %
Quizzes on reading assignments*:	5 %
CIP: Report about the analysis of histological cross-sections:	2 %
Resolution of cases:	3 %
First partial exam:	15 %
Second partial exam:	15 %
Third partial exam:	15 %
Fourth partial exam:	15 %
Final exam:	20 %
Total:	100 %

*The quiz on chapter 1 “Biomolecules” will be taken as diagnostic evaluation of the course.

NOTE:
Getting an average of 70 (four partial exams plus the final exam) is a requirement in order to obtain the CIP points.

8. Course Integrative Product.

Report about the analysis of histological cross-sections:

It consists of a written work, in teams, about the morphological application for the resolution of cases:
Elaboration of a paper where the student will look for a scientific article from PUBMED based on any specific macromolecule of a tissue of the human body. The student must analyze the abstract of the article and describe the objective and the contributions of that work.
Besides that, the student will select two images of histological cross-sections from the article where two different techniques are used and he/she will provide their description. It is worth 2%.

Resolution of cases:
The second part will consist of an exam in which the student will solve a case. It is worth 3%. Correct diagnosis of the organ or structure in 10 histological preparations and later on, the student will say which structure is affected in 4 clinical cases. The student must identify the correct altered structure within a time limit. This will be answered in teams of 5 members.

9. Bibliography

Basic textbooks:

- Kierszenbaum, A. L. (2012) *Histología y Biología Celular - Introducción a la Anatomía Patológica*. Elsevier-Saunders.
- Cuaderno de trabajo del Departamento de Histología de la Facultad de Medicina de la UANL, 2015.

Reference books:

- Welsch U. (2010) *Sobbota Histologia*. Editorial Medica Panamericana,
- Gartner, L.P. y Hiatt, J.L. (2008) *Texto Atlas de Histología*. Edición Mc Graw-Hill Interamericana.
- Junqueira & Carneiro, (2005) *Histología Básica.* Elsevier Masson.
- Geneser (2015) *Histología*. Editorial Medica Panamericana.

Websites:

- Blue Histology: http://teaching.anhb.uwa.edu.au/mb140/
- Virtual Microscopy: http://histology.med.umich.edu/node/82
- Virtual Histology:http://www.meddean.luc.edu/lumen/MedEd/Histo/virtualhistology.htm
- Cell and Tissue Biology: http://www.med.uiuc.edu/histo/medium/atlas/index.htm
- Histology:http://www.path.uiowa.edu/virtualslidebox/histo_path/nlm_histology/content_index_db.html
- Histology Tutorials: http://www-medlib.med.utah.edu/WebPath/HISTHTML/HISTO.html

APPENDIX.

ASSESSMENT AND WORKLOAD

Module workload		Number of hours	Percentage
Contact hours	Class-based instruction	100h (78.74%)	60.47%= 127 horas
	Resolution of clinical cases	8h (6.29%)	
	Workbook exercises	8h (6.29%)	
	Quizzes on reading assignments	4h (3.14%)	
	Exam taking	5h (3.93%)	
	Course integrative product (CIP)	2h (1.57%)	
Independent study	Study	73h (87.95%)	39.52%= 83 horas
	Exam preparation	10h (12.04%)	
Total hours of the workload: 30 hours X 7 credits UANL/ECTS*		210 h	

*European Credit Transfer and Accumulation System
1 UANL credit = 30 hours

NOTE: Rubrics, checklists and evaluation formats are elaborated by using the performance criteria described in each stage of the module.

SUPLEMENTO COVID-19

Siguiendo las recomendaciones de la Secretaría de Salud del país y la Rectoría de la Universidad, ante la coyuntura de salud COVID-19, la organización de la docencia desde marzo del 2020, seguirá un modelo híbrido, donde la docencia se ajustará a los horarios aprobados por la Secretaría de Salud siguiendo un modelo de Presencialidad / No presencialidad en la medida en que las circunstancias sanitarias y la normativa lo permitan. Los estudiantes asistirán a las clases de manera no presencial mediante la transmisión de las mismas de manera síncrona/asíncrona vía “on line”.