1. DATOS BÁSICOS

Subjetct area	Physiology
Degree	Bachelor in Nurging
School/Faculty	Biomedical and Health Science
Year	1st
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery mode	On Campus
Semestre	Semestre 2

2. INTRODUCTION

The Physiology course is a basic subject worth 6 ECTS credits that is taught on a semester basis in the first year of the Nursing degree program. This subject belongs to the "Common Basic Training" module, which has a total of 24 ECTS credits.

Physiology studies the physical and chemical processes that take place in living organisms during the performance of their vital functions. Human physiology, in particular, is the science that connects basic sciences with clinical medicine, seeking to explain the specific characteristics and mechanisms by which the human body behaves as a living organism, how it nourishes itself, how it moves, how it adapts to various environmental circumstances, how it reproduces... Therefore, it encompasses everything from molecules and subcellular components to organs and systems, as well as the interactions that allow us to function as living beings.

Therefore, teaching Physiology to Nursing degree students aims to enable students to learn about the functions of the human organism in health, including understanding the integration of the functions of different organs, systems, and body systems to maintain the functional unity of the entire organism. This knowledge forms the basis for understanding the fundamentals of health and disease later on.

This subject is directly related to Human Anatomy, Biology, and Biochemistry.

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):

- CB1: Students have shown their knowledge and understanding of a study area that builds on general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.
- CB2: That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.
- CB3: Students have the ability to gather and interpret relevant data (normally within their area of study) to form opinions which include reflecting on relevant social, scientific or ethical matters.
- CB4: That students can transmit information, ideas, problems and solutions to both a specialized and non-specialized audience.
- CB5: Students have developed the necessary learning skills to undertake further studies with a high degree of independence.

General skills (CG, by the acronym in Spanish):

- CG14: Establish evaluation mechanisms, considering scientific-technical aspects and quality.
- CG15: Work with the team of professionals as the basic unit in which professionals and other personnel of healthcare organizations are structured in a uni or multidisciplinary and interdisciplinary manner.

Cross-curricular skills (CT, by the acronym in Spanish):

• CT1: Responsibility: That the student is capable of assuming the consequences of their actions and being accountable for their own deeds.

• CT7: Teamwork: That the student is capable of actively participating in the achievement of a common goal, by listening to, respecting, and valuing the ideas and proposals of the other members of their team.

• CT9: Planning: That the student is capable of effectively determining their goals and priorities by defining the actions, deadlines, and optimal resources required to achieve such goals.

• CT10: Innovation-Creativity: That the student is capable of devising new and different solutions to problems that add value to the issues they face.

Specific skills (CE, by the acronym in Spanish):

• CE1: To know and identify the structure and function of the human body. Understand the molecular and physiological bases of cells and tissues.
• CE5: To know and assess the nutritional needs of healthy individuals and those with health problems throughout the life cycle, in order to promote and reinforce healthy eating behavior patterns. Identify nutrients and the foods in which they are found. Identify the most prevalent nutritional problems and select appropriate dietary recommendations.
• CE6: To apply technologies and information and communication systems in healthcare.
• CE7: To understand the pathophysiological processes and their manifestations, as well as the risk factors that determine states of health and disease at different stages of the life cycle.
• CE9: To recognize life-threatening situations and to know how to perform basic and advanced life support maneuvers.

Learning outcomes (RA, by the acronym in Spanish):

- RA1: Ability to recognize and interpret normal or changing signs of health/illness, suffering, and disability in individuals.
- RA2: Ability to question, evaluate, interpret, and critically synthesize a range of information and data sources.
- RA3: Relevant knowledge of and ability to apply natural and life sciences.
- RA4: Ability to adapt to socially complex and ambiguous situations in nursing practice.

The following table shows how the skills developed in the subject area relate to the intended learning outcomes:

Competencias	Resultados de aprendizaje

CB1, CB2, CB3, CB4, CB5 CG14, CG15 CT1, CT7, CT10 CE1, CE5, CE7, CE9	RA1
CB2, CB3, CB4, CB5 CG14, CG15 CT1, CT7, CT9, CT10 CE1, CE5, CE6.	RA2
CB1, CB4, CB5 CG15 CT1 CE5, CE6.	RA3
CB1, CB2, CB3, CB4, CB5 CG15 CT1 CT7, CT9 CE1, CE5, CE6, CE7, CE9	RA4

4. CONTENTS

The subject is organized into two learning units, which, in turn, are divided into topics (depending on the units):

Unit 1: Cellular and General Physiology

1.1 Principles of cellular function. Definitions. Objectives. Organization of the human body. Transport mechanisms: active and passive.

1.2 Internal environment. Body fluids. Homeostasis. Water, electrolyte, and pH control systems.

Unit 2: Physiology of Tissues and Skeletal System

2.1 Physiology of tissues. Definition. Epithelial, nervous, muscular, and connective tissues. Characteristics, properties, and functions of tissues.

2.2 Physiology of the skeletal system. Composition and structure of bone tissue. Types of bones. Ossification. Bone remodeling.

Unit 3: Physiology of the Nervous System

3.1 Cells of the nervous system. Resting and action potentials of neurons. Classification of nerve fibers. Synapses.

3.2 Sensory system. Sensory receptors. Somatic sensitivity. Interpretation of sensory signals. Translation of sensory stimuli into nerve impulses. Levels of integration.

3.3 CNS: Structure and function of the spinal cord. Motor and sensory tracts. Somatic motor pathways. Movement control.

3.4 Autonomic nervous system or vegetative.

3.5 Pain. Components of pain physiology. Nociceptors. Transmission systems. Physiological pain inhibition.

Unit 4: Physiology of Special Senses

4.1 Taste. Physiological functions of the tongue. Sense of taste. Gustatory nerve pathway.

4.2 Smell. Physiological functions of the nose: olfactory sense. Olfactory nerve pathway.

4.3 Vision. Physiological functions of the eye: sense of vision. Accommodation, refraction, and visual acuity. Retina. Optic nerve pathways.

4.4 Hearing and balance. Physiological functions of the ear: auditory sense. External, middle, and inner ear. Auditory nerve pathway.

4.5 Higher functions of the CNS. Brain dominance and language. Intrahemispheric transfer. Learning and memory. Neural plasticity.

Unit 5: Physiology of the Muscular System

5.1 Functional characteristics of muscle. Types of muscle: Smooth and striated.

5.2 Smooth muscle.

5.3 Skeletal muscle.

5.4 Cardiac muscle.

5.5 Tone and posture.

Unit 6: Physiology of Blood

6.1 Introduction to hematology. Concept and functions of blood. Characteristics and composition of blood.

6.2 Hemostasis and coagulation. Mechanisms involved in maintaining hemostasis. Clinical applications.

6.3 Blood groups and types. Transfusions.

Unit 7: Physiology of the Immune System

7.1 Lymphatic system.

7.2 Innate immunity.

7.3 Adaptive immunity.

Unit 8: Cardiovascular Physiology

8.1 Introduction to cardiovascular physiology. Functional components of the circulatory system. The heart. Blood flow. General circulation. Pulmonary circulation. Circulation in special regions.

8.2 Electrical system of the heart. Cardiac excitation system. Cardiac action potentials. Slow action potential. Fast action potential. Refractory period. Electrocardiogram. Clinical application.

8.3 Mechanical system of the heart. Cardiac cycle. End-diastolic, systolic volumes, and stroke volume. Heart sounds and murmurs.

8.4 Cardiac output and regulation of heart rate. Cardiac output. Regulation of cardiac output. Regulation of stroke volume. Regulation of heart rate.

8.5 Hemodynamics, circulation, and blood pressure. Generalities. Vessel wall structure. Hemodynamics.

8.6 Regulation of circulation and blood pressure. Clinical application.

Unit 9: Respiratory Physiology

9.1 Introduction to respiratory physiology. Anatomical and functional division of the respiratory tract. Conduction system. Pleura. Blood supply. Lymphatic system.

9.2 Pulmonary mechanics. Ventilation or breathing. Pulmonary mechanics. Lung volumes. Lung capacities. Minute ventilation. Dead space. Alveolar ventilation. Lung distensibility. Airflow. Resistance.

9.3 Gas exchange. Gas diffusion. Oxygen transport. Carbon dioxide transport.

9.4 Regulation of pulmonary ventilation. Nervous, chemical, and mechanical control of pulmonary ventilation. Other factors influencing ventilation. Clinical application.

Unit 10: Physiology of the Digestive System

10.1 Digestive physiology I. Gastrointestinal tract response to intake. Cephalic phase of the integrated meal response. Oral phase. Esophageal phase. Gastric phase.

10.2 Digestive physiology II. Small intestine phase of the integrated meal response. Colonic phase. Defecation.

10.3 General functions of the liver. Metabolism. Detoxification. Formation and secretion of bile. Gallbladder. Formation and excretion of bilirubin. Liver ammonia treatment.

Unit 11: Renal Physiology

11.1 Elements of renal function. Urine formation. Glomerular filtration. Tubular reabsorption. Tubular secretion. Micturition. Innervation of the urinary tract. Urine composition.

11.2 Regulation of water reabsorption and urine concentration.

Unit 12: Endocrine System Physiology

12.1 Hormones. Classification. Hormonal secretion. Hormone transport in blood.

12.2 Hypothalamic-pituitary axis.

12.3 Thyroid glands. Parathyroid glands.

12.4 Adrenal gland. Medullary and cortical hormones.

12.5 Endocrine pancreas.

Unit 13: Reproductive System Physiology

13.1 Male reproductive system. Testicular physiology. Spermatogenesis. Hypothalamic-pituitary-testicular axis. Hormonal factors. Testosterone. Regulation. Male reproductive pathways.

13.2 Female reproductive system. Ovarian physiology. Oogenesis. Menstrual and ovarian cycles. Estrogens-Progesterone. Hormonal regulation. Female reproductive pathway. Pregnancy, childbirth, and lactation. Menopause.

5. TEACHING-LEARNING METHODS

The types of teaching-learning methods are as follows:

- Master class
- Cooperative learning
- Communicative tasks
- Problem Based Learning (PBL)
- Simulation environments

• Case method

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On Campus

Learning activity	Number of hours
Master Classes	30 h
Asynchronous Master Classes	12 h
Practical exercises	25 h
Seminars	5 h
Self-study	40 h
Tutorships	10 h
Presentations	2 h
Case analysis	24 h
Knowledge test	2 h
TOTAL	**150 h**

7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:

On campus:

Sistema de evaluación	Peso
Oral presentations	20%
Portafolio	10%
Directed individual work	30%
Knowledge test	40%

TOTAL	**100%**

On the Virtual Campus, when you open the subject area, you can check the guide with the details of your assessment activities, including the deadlines and assessment procedure for each.

8. BIBLIOGRAPHY

The works of reference for following up this subject area are:

- TORTORA G. & DERRICKSON B. (2018) **Principios de Anatomía y Fisiología**. Buenos Aires: Panamericana. 15ª Edición
- GUYTON AC & HALL JE. (2016) **Tratado de Fisiología médica**. Barcelona: Elsevier. 13ª edición.
- SILVERTHORN D. (2019) **Fisiología humana: un enfoque integrado**. Panamericana. 8ª edición.

Recommended complementary bibliography:

- BERNE RM & LEVY MN. (2018). **Fisiología**. Barcelona: Elsevier. 7ª Edición
- JUNQUEIRA, L.C. & CARNEIRO, J. (2015) **Histología Básica**. Barcelona: Editorial Médica Panamericana, D.L. 12ª edición.
- POCOCK G. (2005) **Fisiología humana: la base de la medicina**. Barcelona: Masson. 2ª edición.
- ANTONY, C.P. (1983) **Anatomía y fisiología**. México: Interamericana. 10ª edición.
- MARIEB E.N. (2011). **Fisiología humana y fisiología humana**. Madrid: Pearson Education, D.L. 9ª edición.
- STANFIELD C.L. (2011). **Principios de fisiología humana**. Madrid: Addison Weley, D.L. 4ª edición.