1. OVERVIEW

Subject Area	MORPHOLOGY, STRUCTURE AND FUNCTION OF ORGANS AND SYSTEMS I
Degree	DEGREE IN MEDICINE
Faculty	BIOMEDICAL AND HEALTH SCIENCES
Ac. Year	2º
ECTS	16
Type	COMPULSORY
Language(s)	SPANISH
Delivery Mode	ON CAMPUS
Semester	S3 (S1)

2. INTRODUCTION

The teaching project at the Universidad Europea has great interest in the integrated teaching of the three basic disciplines in the study of the human body in the 2nd year of the Degree in Medicine. This approach aims to provide a holistic overview of the morphology, structure and function of the organs and systems which make up a healthy human body. Good knowledge of the evolutionary processes, morphological development and corresponding functions, and all the organs which make up a healthy human body will allow students to meet the challenge of suspecting and identifying the causes of different pathologies. It will also help them identify and interpret signs and symptoms which arise during the pathological loss of homoeostasis which will prepare them to establish differential diagnosis algorithms to correctly identify the pathology the patient presents.

The subject area integrates the disciplines of embryology, anatomy, histology and physiology which are the basic learning tools for gaining knowledge of the structure and function of the human body. These are foundation subjects for studying a degree in medicine. In the first-year students will have already studied physiology, biology on a cellular level, biochemistry and genetics. This subject area builds on these and integrates the structure and function in a complete overview of the organic systems. Therefore, the content in this subject area, as in part II further on, is organised into an integrated programme which delves deep into morphology, structure and function of the different systems of the body. Given the size of this subject, it is taught over two terms, with the organic systems divided over the two depending mostly on the location of these systems in the human body.

3. SKILLS AND LEARNING OUTCOMES

BASIC SKILLS (CB, by the Spanish acronym)

CB.1. 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.

GENERAL SKILLS (CG, by the Spanish acronym)

CG.7. Understand and recognise the normal structure and function of the human body. This includes studies of molecules, cells, tissue, organs and systems in the different stages of life.

CG.11. Understand and recognise the effects of growth, development and ageing on the individual and the social environment.

CROSS-CURRICULAR SKILLS

CT.3. Teamwork: ability to integrate and collaborate actively with other people, areas and/or organisations to reach common goals, evaluate and integrate contributions from the rest of the group members and create a good working environment.

CT.8. Planning and organization: ability to set objectives and choose the right means to fulfil them through the efficient use of time and resources.

CT.10. Independent learning: the ability to govern your own development by choosing the most effective lines of action, strategies, tools and opportunities to independently learn and apply knowledge to practice.

SPECIFIC SKILLS (CE, by the Spanish acronym):

Module: Morphology, structure and function of the human body.

CE.1.1.2. Understanding the fundamentals of human nutrition. Cell communication. Excitable membranes. The Cell Cycle. Cellular differentiation and proliferation. Gene expression, information and regulation. Heredity. Embryo development and organogenesis.

CE.1.2.1. Understanding the morphology, structure and function of the different systems and apparatus: cardiovascular, digestive, locomotor, reproductive, urinary, respiratory, endocrine, immune, integumentary, circulatory, and central and peripheral nervous systems. Growth, maturity and ageing of the different systems and apparatus. Homoeostasis. Adaptation to environment.

CE.1.2.2. Using basic laboratory techniques and materials. Interpreting a normal analysis. Using macroscopic, microscopic and imaging techniques to recognise the morphology and structure of tissue, organs and systems. Performing functional tests and determining vital signs and how to interpret them. The basic physical examination.

LEARNING OUTCOMES (AS THEY APPEAR IN THE DEGREE IN MEDICINE PROFILE)

- Relate human anatomy to other biological sciences.
- Understand normal embryo development of the different systems and apparatus.
- Understand and identify anatomical structures which for part of the circulatory, digestive, respiratory, reproductive, endocrine, kidney and urinary tract apparatus.
- Understand and identify the components of the nervous system and the sense organs.
- Understand how the different anatomical structures relate to each other.
- Relate the morphology of the different systems and apparatus to their function.
- Understand the normal external structure of a living human and apply this structural and topographical knowledge to clinical exploration.
- Be aware of the macroscopic and imaging techniques to study the morphology and structure of organs and systems.
- Apply theoretical and practical knowledge of anatomy as a base to understand the different medical disciplines.
- Have the ability to understand and synthesise simple texts and publications on anatomy.
- Understand the fundamentals of the physiology of exercise, ageing and adaptation to extreme conditions.
- Know the physiological mechanisms of control and regulation of body temperature.
- Know how to interpret a normal blood analysis.
- Understand how the cardiac muscle and the cardiac conduction system work.
- Know how to perform and interpret a basic ECG.
- Describe the changes in pressure and volume which occur during the cardiac cycle.
- Know how to locate the points for auscultation and identify normal heart sounds.
- Understand the physiology of blood circulation, microcirculation, venous circulation and lymphatic circulation.

- Recognise the characteristics of a normal arterial pulse.
- Know how to identify the pulse points and measure blood pressure.
- Describe the functions of the respiratory system.
- Know the characteristics of ventilatory mechanics.
- Know how to identify normal respiratory sounds through auscultation.
- Know how to perform and interpret a basic spirometry.
- Understand the physiology of gas exchange and the transport of gases in the blood.
- Know how to interpret a blood gas test and the pH in the blood.
- Understand the general functioning of the nervous system and the functions the afferent and efferent neurons have.
- Understand the nerve structure and mechanisms which intervene in the working of superior functions.
- Know how to perform a basic neurological examination.
- Learn how different types of tissues connect to form organs and systems.
- Understand the normal microscopic morphology and structure of the different systems and apparatus.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Relate human anatomy to other biological sciences.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CG.11. CE.1.1.2.	Understand normal embryo development of the different systems and apparatus.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand and identify anatomical structures which for part of the circulatory, digestive, respiratory, reproductive, endocrine, kidney and urinary tract apparatus.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Understand and identify the components of the nervous system and the sense organs.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand how the different anatomical structures relate to each other.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Relate the morphology of the different systems and apparatus to their function.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2.	Understand the normal external structure of a living human and apply this structural and topographical knowledge to clinical exploration.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Be aware of the macroscopic and imaging techniques to study the morphology and structure of organs and systems.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Apply theoretical and practical knowledge of anatomy as a base to understand the different medical disciplines.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Have the ability to understand and synthesise simple texts and publications on anatomy.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CG.B.11.	Understand the fundamentals of the physiology of exercise, ageing and adaptation to extreme conditions.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Know the physiological mechanisms of control and regulation of body temperature.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Know how to interpret a normal blood analysis.

CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand how the cardiac muscle and the cardiac conduction system work.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to perform and interpret a basic ECG.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Describe the changes in pressure and volume which occur during the cardiac cycle.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to locate the points for auscultation and identify normal heart sounds.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand the physiology of blood circulation, microcirculation, venous circulation and lymphatic circulation.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Recognise the characteristics of a normal arterial pulse.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to identify the pulse points and measure blood pressure.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Describe the functions of the respiratory system.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Know the characteristics of ventilatory mechanics.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to identify normal respiratory sounds through auscultation.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to perform and interpret a basic spirometry.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand the physiology of gas exchange and the transport of gases in the blood.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Know how to interpret a blood gas test and the pH in the blood.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand the general functioning of the nervous system and the functions the afferent and efferent neurons have.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Understand the nerve structure and mechanisms which intervene in the working of superior functions.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to perform a basic neurological examination.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1.	Learn how different types of tissues connect to form organs and systems.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2.	Understand the normal microscopic morphology and structure of the different systems and apparatus.

4. CONTENTS

UNIT 1. The nervous system.
1.1 General introduction.
1.2 Embryology.
1.3 Envelopment and vascularisation of the brain.

1.4 Spinal cord.
1.5 Brain stem, cranial nerves and cerebellum.
1.6 Midbrain.
1.7 Cerebrum.
1.8 Complex brain functions (hemispheric dominance, language, electroencephalogram, sleep, memory and the limbic system).
1.9 Motor system: cortex, cerebellum, basal ganglia and descending pathways.
1.10 Somatosensory system, touch, temperature and nociceptive system.
1.11 Special senses (sight, hearing and chemical senses).
1.12 Autonomic nervous system: sympathetic and parasympathetic.
UNIT 2. The cardiovascular system.
2.1 Embryology of the heart and vessels.
2.2 Thoracic cavity and the structure of the heart.
2.3 External and internal morphology of the heart.
2.4 Vascularisation and innervation of the heart. Coronary vessels.
2.5 Great arterial and venous vessels.
2.6 Histology of the heart and blood vessels.
2.7 Cardiac physiology.
2.8 Electrocardiogram (ECG).
2.9 Heart sounds.
2.10 Biophysics of arteries and veins.
2.11 Physiology of arteries and veins. Microcirculation. Coronary circulation.
2.12 Regulation of blood pressure.
UNIT 3. The Respiratory System.
3.1 General introduction.
3.2 Embryology of the respiratory system.
3.3 Anatomy and histology of the upper respiratory tract: nasal cavity, pharynx and larynx.
3.4 Functions of the upper respiratory tract.
3.5 Anatomy and histology of the lower respiratory tract: trachea, bronchial tree (conduction/interchange passageways).
3.6 Functions of the lower respiratory tract.
3.7 Lungs and pleural cavities.
3.8 Physiology of ventilation.
3.9 Properties of the lungs.
3.10 Pulmonary circulation.
3.11 Transport of O_2 and CO_2.
3.12 Regulation of respiration.

5. TEACHING-LEARNING METHODS

The types of teaching/learning methods are as follows:

TEACHING METHODS
Lectures: Classroom presentations by the lecturer on basic theory, encouraging debate and student participation.

Problem-based learning: Case introduction, reorganising into small groups, literature analysis, analysis of scientific texts and documents, symposiums and presentations, directed debates, specialised individual and collective tutorials, and reaching a consensus
Learning in skills classes and simulation environments: Practical work with IT programs, anatomical models, human dissection and standardised patients.
Learning based on specific laboratory teaching.

Learning Activities	Type of learning activity
Activity 1: Contextualisation of the learning objective by the teacher and assessment of the prior knowledge acquired by the student.	Theory/practical learning activities
Activity 2: Presentation by the teacher with visual support aids which encourage debate and student participation.	Theory/practical learning activities
Activity 3: Analysis and description of anatomical/functional models.	Theory/practical learning activities
Activity 5: Viewing complementary videos.	Directed learning activities
Activity 6: Use of specific image or simulation applications.	Directed learning activities
Activity 7: Case approach and solving cases and problems either as an individual or in small groups.	Directed learning activities
Activity 8: Integrated activities through the introduction of clinical scenarios.	Directed learning activities
Activity 9: Practical exercises in human dissection in cadavers supported by computer applications.	Theory/practical learning activities
Activity 10: Practical histology laboratory sessions to identify the different tissues which make up the organs.	Theory/practical learning activities
Activity 11: Simulation activity in the laboratory to obtain functional parameters through physiological exploration and physical examination.	Theory/practical learning activities
Activity 12: *Flipped classroom.*	Independent working
Activity 13: Independent working	Independent working
Activity 14: Tutorials	Tutorials
Activity 15: Objective test	Knowledge test

6. LEARNING ACTIVITIES

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

Type of learning activity	Number of hours
Theory/practical learning activities	179 h
Directed learning activities	47 h
Independent working	120 h

Tutorials	48 h
Knowledge tests	6 h
TOTAL	**400 h**

7. BIBLIOGRAPHY

The recommended bibliography is indicated below:

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- **“Survival Kit for the Physiology Student”.** Cambridge Scholars Publishing. 2021.