1. OVERVIEW

Subject Area	MORPHOLOGY, STRUCTURE AND FUNCTION OF ORGANS AND SYSTEMS II
Degree	DEGREE IN MEDICINE
Faculty	BIOMEDICAL AND HEALTH SCIENCES
Ac. Year	2º
ECTS	16
Type	COMPULSORY
Language(s)	SPANISH
Delivery Mode	ON CAMPUS
Semester	S4

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 demonstrated possession and understanding of knowledge in a study area that builds on general secondary education, and is typically at a level that, while supported by advanced textbooks, also includes aspects that involve knowledge from the forefront of 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):

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 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 how to interpret a blood gas test and the pH in the blood.
- Describe the functions of the gastrointestinal system.
- Understand the processes of motility, digestion and absorption.
- Understand the functions of the liver and pancreas.
- Describe the functions of the renal system and the filtration, reabsorption and secretion processes.
- Understand how the kidney regulates pH.
- Know how to interpret a normal urine analysis.
- Understand the physiology of the endocrine system.
- 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.3.	Relate human anatomy to other biological sciences.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CG.11. CE.2.	Understand normal embryo development of the different systems and apparatus.
CB.1. CG.7. CT.8. CT.10. CE.3.	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.3.	Understand how the different anatomical structures relate to each other.
CB.1. CG.7. CT.8. CT.10. CE.3.	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.3.	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.11.	Understand the fundamentals of the physiology of exercise, ageing and adaptation to extreme conditions.
CB.1. CG.7. CT.8. CT.10. CE.3.	Know how to interpret a blood gas test and the pH in the blood.
CB.1. CG.7. CT.8. CT.10. CE.3.	Describe the functions of the gastrointestinal system.
CB.1. CG.7. CT.8. CT.10. CE.3.	Understand the processes of motility, digestion and absorption.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Understand the functions of the liver and pancreas.

CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Describe the functions of the renal system and the filtration, reabsorption and secretion processes.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Understand how the kidney regulates pH.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Know how to interpret a normal urine analysis.
CB.1. CG.7. CT.8. CT.10. CE.1.2.1. CE.1.2.2. CT.3.	Understand the physiology of the endocrine system.
CB.1. CG.7. CT.8. CT.10. CE.3.	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 4. Lymphatic system.
4.1 Embryology of the lymphatic system.
4.2 Anatomy, histology and function of the lymphatic organs and tissues: Thymus, spleen, lymph nodes.
4.3 Groups of lymph nodes and their areas. Lymphatic collector trunks.
4.4 Lymphatic vessels. Formation and circulation of lymph.
UNIT 5. Digestive System
5.1 Embryology of the digestive tract.
Development of the anterior intestine.
Development of the middle intestine.
Development of the posterior intestine.
5.2 Anatomy, histology and general physiology of the digestive system.
5.3 Anatomy, histology and general physiology of the oral cavity.
5.4 Physiology of the formation and secretion of saliva.
5.5 Anatomy, histology and general physiology of the oesophagus. Swallowing.
5.6 Anatomy, histology and physiology of the stomach: motility, secretion and digestion.
5.7 Anatomy and histology of the liver and bile ducts.
5.8 Functions of the liver. Formation of bile.
5.9 Anatomy and histology of the pancreas and small intestine.
5.10 Physiology of the pancreas and the small intestine: motility, secretion, digestion and absorption.
5.11 Anatomy, histology and general physiology of the large intestine. Bacterial flora. Defecation reflex.
5.12 Digestion control.
UNIT 6. Excretory system
6.1 Embryology of the excretory system.
6.2 Renal anatomy and the urinary tracts.
6.3 Physiology of micturition.
6.4 Histology of the excretory system.
6.5 Formation of urine: filtration, reabsorption, secretion.
6.6 Renal physiology and control of osmolarity.
6.7 Homoeostasis of potassium, calcium and magnesium.
6.8 Renal control of blood pressure and acid-base equilibria.
UNIT 7. The endocrine system
7.1 Introduction and general guide to the endocrine system.

7.2 Hormones.
Hormonal transport and secretion.
Mechanisms of hormonal action.
7.3 Hypothalamus and pituitary gland.
Posterior pituitary hormones.
Anterior pituitary hormones.
7.4 Adrenal cortex (Embryology, anatomy, histology and cortical hormones).
7.5 Thyroids (Embryology, anatomy, histology and thyroidal hormones).
7.6 Parathyroids and metabolism of calcium. Parathyroid hormones and calcitonin. Vitamin D.
7.7 Endocrine pancreas. (Embryology, anatomy, and histology of the endocrine pancreas, pancreatic hormones, regulation of glycaemia).
7.8 Energy metabolism. Fasting and exercise.
7.9 Adipose tissue and obesity. Regulation of appetite.
UNIT 8. The reproductive apparatus (female and male).
8.1. Embryology of the reproductive system.
8.2 Anatomy of the male reproductive system.
8.3 Histology of the male reproductive system.
8.4 Physiology of the male reproductive system. Gametogenesis and production of androgens. Physiology of the erection and ejaculation.
8.5 Anatomy, histology and physiology of the ovaries, Fallopian tube and uterus.
8.6 Anatomy, histology and physiology of the vagina, vulva, perineum and mammary glands.
8.7 Female reproductive cycle. Sexual hormones.
8.8 Pregnancy and birth.

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 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.**	**A** Explanatory theory classes
• **Activity 2: Presentation by the teacher with visual support aids which encourage debate and student participation.**	**A** Explanatory theory classes
• **Activity 3: Analysis and description of anatomical/functional models.**	**B** Practical workshops/simulation
• **Activity 5: Viewing complementary videos.**	**B** Practical workshops/simulation

• **Activity 6: Use of specific image or simulation applications.**	**B** Practical workshops/simulation
• **Activity 7: Case approach and solving cases and problems either as an individual or in small groups.**	**C** Case study sessions
• **Activity 8: Integrated activities through the introduction of clinical scenarios.**	**C** Case study sessions
• **Activity 9: Practical exercises in human dissection in cadavers supported by computer applications.**	**B** Practical workshops/simulation
• **Activity 10: Practical histology laboratory sessions to identify the different tissues which make up the organs.**	**B** Practical workshops/simulation
• **Activity 11: Simulation activity in the laboratory to obtain functional parameters through physiological exploration and physical examination.**	**B** Practical workshops/simulation
• **Activity 12: *Flipped classroom.***	**D** Independent working
• **Activity 13: Independent working**	**D** Independent working
• **Activity 14: Tutorials**	**E** Tutorials
• **Activity 15: Objective test**	**F** Objective 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**

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The recommended bibliography is indicated below:

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- **Anatomía con orientación clínica**. Moore K.L./ Dalley A.F. Anatomía con orientación clínica. 6ª Edición. 2009 LIPPINCOTT WILLIAMS & WILKINS
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- **Atlas de Embriología Humana**. Cochard, L.R. 2005. Masson-Elsevier
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