



## PRESENTATION

### Short description of the course:

This 8-week course focuses on the study of several organ systems with an integrated approach that encompasses Embryology, Anatomy, Histology, Radiology, Biophysics and Physiology. The aim of the course is to emphasize the tight correlation existing between morphology and function in the different systems, in order to provide solid foundations on the normal structure and function of the human body, to better understand pathology. Students will be able to integrate the theoretical knowledge with hands-on work on cadavers, radiological and histological imaging, and clinical cases.

The systems included in this course are:

- Digestive system
- Endocrine system
- Reproductive system
- Head & Neck. Sense organs
- Nervous system

- **Degree:** Degree in Medicine
- **Module/Course:** Module 1: Morphology, structure and function of the human body.  
1.2: Foundations of morphology and function.
- **ECTS:** 12
- **Year, semester:** 1st year, bimestral
- **Type of course:** Basic
- **Course director:** Dr. Elisa Mengual ([emp@unav.es](mailto:emp@unav.es))
- **Faculty:**

- Dr. J. Burguete, Full Professor - Biophysics Dept - [javier@unav.es](mailto:javier@unav.es) [CV](#)
- Dr. M. Cuadrado, Professor - Pathology, Anatomy and Physiology Dept - [mcuadrado@unav.es](mailto:mcuadrado@unav.es), [CV](#)
- Dr. E. Mengual, Associate Professor - Pathology, Anatomy and Physiology Dept - [emp@unav.es](mailto:emp@unav.es) [CV](#)
- Dr. C. de Andrea, Professor - Pathology, Anatomy and Physiology Dept - [ceandrea@unav.es](mailto:ceandrea@unav.es) [CV](#)
- Dr. J. Argemí, Adjunct Clinical Associate Professor - Internal Medicine Dept - [jargemi@unav.es](mailto:jargemi@unav.es), [CV](#)
- Dr. C. Perdomo, Adjunct Clinical Professor - Endocrinology Dept - [cperdomo@unav.es](mailto:cperdomo@unav.es) [CV](#)
- Dr. A. Benito, Professor - Radiology Dept - [albenitob@unav.es](mailto:albenitob@unav.es) [CV](#)
- Dr. P. Domínguez, Adjunct Clinical Professor - Radiology Dept - [pdaniel@unav.es](mailto:pdaniel@unav.es), [CV](#)
- Dr. M. Alegre, Professor - Neurophysiology Dept - [malegre@unav.es](mailto:malegre@unav.es) [CV](#)
- Dr. Iciar Avilés, Adjunct Clinical Professor - Neurophysiology Dept - [iaviles@unav.es](mailto:iaviles@unav.es) [CV](#)



- **Language:** English
- **Room:** Lecture Hall 4E02

## COMPETENCES

### BASIC COMPETENCES

The degree in Medicine indicates that:

- **CB1** - Students have shown to possess and understand knowledge in an area of study that develops from general secondary education, and is usually at a level that, although requiring advanced textbooks, also includes some aspects that imply knowledge from the forefront of their field of study.
- **CB3** - Students have the capacity to collate and interpret relevant data (normally within their area of study) in order to express opinions that include reflection on relevant subjects of social, scientific or ethical nature.
- **CB4** - Students can transmit information, ideas, problems and solutions to specialist and non-specialist audiences alike.

### GENERAL COMPETENCES

At the end of the course, the students should be able to:

- **CG6** - Develop professional practice with respect to other health professionals, acquiring teamwork skills.
- **CG07** - Understand and recognize the structure and normal function of the human body at the molecular, cellular, tissular, organ and systems level over the different stages of life and in both sexes.
- **CG09** - Understand and recognize the effects, mechanisms and manifestations of disease on the structure and function of the human body
- **CG10** - Understand and recognize the causative agents and the risk factors that determine states of health and the development of disease.
- **CG11** - Understand and recognize the effects of growth, development and ageing on the individual and his or her social environment.
- **CG31** - Know about, critically evaluate and know how to use sources of clinical and biomedical information in order to obtain, organize, interpret and communicate scientific and health information.

### SPECIFIC COMPETENCES

Students should understand the following mechanisms, processes and techniques:

- **CE1** - Cellular structure and function.
- **CE3** - Metabolism.
- **CE4** - Metabolic regulation and integration.
- **CE5** - Basic principles of human nutrition.
- **CE6** - Cellular communication.
- **CE7** - Excitable membranes.
- **CE12** - Embryonic development and organogenesis.
- **CE13** - Morphology, structure and function of the skin; blood, and circulatory, digestive, locomotor, reproductive, excretory and respiratory systems; endocrine, immune and both central and peripheral nervous systems.
- **CE14** - Growth, maturation and ageing of the different apparatuses and systems.
- **CE15** - Homeostasis.
- **CE17** - Management of basic laboratory material and techniques.



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- **CE18** - Normal laboratory analyses interpretation.
- **CE19** - Morphological and structural identification of tissues, organs and systems with macroscopic and microscopic methods and with imaging techniques.
- **CE119** - Radiological imaging.
- **CE120** - Basic radiological semiology for the various apparatuses and systems.
- **CE131** - Main indications of the different electrophysiological techniques (ECG, EEG, EMG and others).
- **CE133** - Scarring.

## PROGRAM

### Digestive system (1 + ½ weeks)

- Embryological development of the digestive system and main congenital defects.
- Anatomy of the digestive system. Vascularization and innervation.
- Histology of the gastrointestinal tract.
- Radiological anatomy of the digestive system.
- Gastrointestinal (GI) tract motility.
- Secretory function of the GI tract. Glands: histology and physiology.
- Digestion and absorption. Exocrine function of pancreas.
- Histology and physiology of the liver.

### Endocrine system (1 week)

- Hormones: classification and mechanisms of action
- Pituitary gland: histology and pituitary hormones
- Growth hormone
- Thyroid: histology and thyroid hormones
- Calcium and phosphate metabolism
- Pancreas: histology and pancreatic hormones
- Adrenal glands: histology and adrenal gland hormones
- Physiology of adipose tissue
- Physiology of lipid metabolism

### Reproductive system (1 week)

- Sex determination. Embryological development of the reproductive system and main congenital defects.
- Anatomy and histology of male reproductive system.
- Male reproductive physiology.
- Anatomy and histology of the female reproductive system.
- Radiological anatomy of male and female pelvis and perineum.
- Female reproductive physiology. Pregnancy and labor. Lactation.

### Head and neck. Sense organs (1 + ½ weeks)

- Embryological development of head and neck. Pharyngeal arches and derivatives. Craniofacial malformations.
- Nasal cavities and paranasal sinuses.
- Origin and components of cranial nerves.
- The tongue. The pharynx.
- The larynx.



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- Muscles of the mimic.
- The mandible and the temporomandibular joint. Masticatory muscles.
- Sensory innervation of the head.
- Vascularization and lymphatics of head and neck.
- Pharyngeal derivatives. The thyroid gland. Congenital defects. Visceral innervation of glands.
- The orbit and its contents. Anatomy and histology of the eye. Biophysical basis of optic function: normal eye, depth of field, refractive disorders.
- Anatomy and histology of the ear. Biophysical basis of sound transmission.

## Nervous system (3 weeks)

- Organization of the CNS
- Meninges, CSF and ventricular system.
- Vascularization of brain and spinal cord. Radiological anatomy of head and neck vascularization.
- The spinal cord. Main ascending and descending tracts.
- The brainstem.
- The cerebellum.
- Diencephalon: thalamus and hypothalamus.
- The telencephalon. Basal ganglia.
- The cerebral cortex.
- Sensory systems: somatosensory, visual, auditory and vestibular systems. Olfaction.
- The motor system.
- Motor cortex and descending tracts.
- Physiology of the basal ganglia.
- Physiology of the cerebellum.
- Balance and gait.
- Radiological anatomy of the CNS.
- Pain pathways and pain control.
- Electroencephalography.
- Sleep.
- Memory and language.
- Other cortical functions: praxias, gnosias, executive function.
- Brain and emotions.

## EDUCATIONAL ACTIVITIES

**Lectures:** with the aim to provide a theoretical background of the main topics. It is not the objective to cover all the content of the subject, but to underline the most important points, help to assimilate the difficult issues and answer the students' questions. Flipped classroom methodology may be used. In any case, it is most relevant that the students work on the previously provided or proposed materials, to make the most of the ensuing activities in the classroom.

**Team based learning sessions** is a flipped classroom methodology that promotes active and dynamic learning. These sessions will be framed with clinical cases, so that through the development of clinical reasoning, the student may integrate the basic concepts in the clinical context. For the development of these sessions the students will be organized in groups.



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**Practical or laboratory sessions** of biophysics, histology, physiology, radiology, and anatomy. The aim is to integrate radiological (radiographies, ultrasound, computerized tomography and magnetic resonance imaging) and gross anatomy. We will use biophysics problem solving, histological and radiological images, cadaver and dissection preparations. These activities will be done in small groups.

## Personal study:

- Previous work on the provided or proposed materials.
- Independent and self guided learning of virtual or on-line resources that allow the students to recognize the structures of histologic, radiologic and gross anatomy images.
- Study of the materials posterior to the in-person or on-line sessions.

**Mentoring:** the teachers will be available for personal on-line or face-to-face tutorials with the students

## ASSESSMENT

The final grade of the course (over 105%) will be calculated as follows:

- **45%**, the grade of the **1st part** of the course
- **55%**, the grade of the **2nd part** of the course
- **5%**, the group leader grade

### ORDINARY EXAM

- **First part of the course: Digestive system, Endocrine system, reproductive system (45% out of 105%)**

- Theoretical exam: Friday, **June 2, 2023** ( # 9 am-12.30 pm) - **80%** (multiple choice test, 70% + short questions, 30%)
- Practical exam (Digestive and Reproductive systems): **Friday, June 2, 2023** (# 1 pm - 5 pm) - **10%**
- Continuous evaluation: quizzes and TBL quizzes - **10%**

- **Second part of the course: Head and neck- Sense organs and Nervous system (55% out of 105%)**

- Theoretical exam: Monday, **May 29, 2023** ( # 9 am-12.30 pm) - **75%** (multiple choice test, 70% + short questions, 30%)
- Practical exam (Neuroanatomy): **Monday, May 29, 2023** (# 1 pm - 4 pm) - **10%**
- Practical exam (Head and neck, sense organs): **Friday, June 2, 2023** (# 1 pm - 5 pm) - **10%**
- Continuous evaluation: quizzes and TBL quizzes - **5%**



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- Group leader grade (5% out of 105%)

In order to pass the course, a **minimum grade of 5/10 needs to be obtained in each of the two parts of the course**

### EXTRAORDINARY EXAM

Those who did not pass the May exam because they did not obtain the minimum grade in **one** of the parts only, will only need to take the exam on the part they failed, while the grade obtained in May for the passed exam will be saved and used to calculate the final grade (45% and 55%, 1st and 2nd parts, respectively). This grade will not be saved for a 3rd or higher exam.

Students who failed the two parts in May, will take the complete exam in June.

**100%** of the grade – final exam on the Digestive, Endocrine, Reproductive systems and/or Head and Neck and Nervous system

- Theoretical exam (**80%** final grade) 125 multiple choice questions + figure plate with histological images
- Practical exam (**20%** final grade) – 25-30 questions on cadaveric specimens+ 10 questions on Nervous system specimens

### HORARIOS DE ATENCIÓN

- Dr. Mengual: by appointment via email emp@unav.es. Office: Anatomy Dept at Los Castaños, Basement, Room S190.
- Dr. Diez: Mondays from 4-5.30 pm, by appointment via email ndiez@unav.es. Office: Los Castaños, 0 floor, Room 0340.
- Other Professors: by appointment via email.

### BIBLIOGRAPHY

Recommended primary text books and resources:

#### Anatomy

##### 1. Textbooks

- Drake, Vogl, Mitchell. Gray's Anatomy for students. 4th ed. Ed. Elsevier. (2020). [Find it in the Library](#)
- Moore, Dalley, Agur. Clinically oriented anatomy. 8th ed. Ed. Wolters Kluwer. (2018). [Find it in the Library](#)



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## 2. Atlas

- Netter. Atlas of Human Anatomy. 7th ed. Elsevier (2019). [Find it in the Library](#)
- Gilroy y cols. Prometheus. Atlas de Anatomía. 2ª edición. Ed. Panamericana (2014). [Find it in the Library](#)
- Sobotta. Atlas de Anatomía Humana, 19ª-23ª edición. Ed. Panamericana [Find it in the Library](#)

## 3. Complementary textbooks

- Feneis y Dauber. Nomenclatura anatómica ilustrada, 5ª edición. Ed. Masson [Find it in the Library](#) (e-book)

## Embryology

- Moore, Persaud, Torchia. The developing human: clinically oriented embryology. 11th ed. (2020). [Find it in the Library](#) (e-book)
- Carlson. Human embryology and developmental biology. 6th ed. Ed Elsevier (2019). [Find it in the Library](#) (e-book)
- Sadler. Langman's medical embryology. 14th ed. Ed. Wolters Kluwer. [Find it in the Library](#)

## Histology

1. Kierszenbaum A.L. & Laura Tres L. Histology and Cell Biology: An Introduction to Pathology. 5th ed. [Find it in the library](#)
2. Mescher A.L. Junqueira's Basic histology : text and atlas. 16th ed. 2021. [Find it in the library](#) (e-book)
3. Essential reading will be made available by the course instructor.
4. Histology and Virtual Microscopy at the University of Michigan. Learning
5. Resources: <http://histology.med.umich.edu>

## Radiology

1. Fleckenstein P. Anatomy in diagnostic imaging. [Find it in the library](#) (e-book)
2. Weir J. Atlas de anatomía humana por técnicas de imagen. [Find it in the library](#) (e-book)

## Biophysics

### Text books

1. Jay Newman. Physics of the Life Sciences. Springer. 2008. [Find it in the library](#) (e-book)
2. R.K. Hobbie, Intermediate Physics for Medicine and Biology, Springer. [Find it in the Library](#)
3. Irving P. Herman. Physics of the Human Body. 2nd Edition, Editorial Springer, 2016. [Find it in the library](#)

## Neurosciences

- HAINES, D.E., MIHAILOFF G.A., Fundamental Neuroscience for basic and clinical applications. Elsevier, 5th Edition, 2018. [Find it in the library](#)
- MTUI E., GRUENER G., DOCKERY P. Fitzgerald Neuroanatomía Clínica y Neurociencia. Elsevier, Barcelona 2016. [Find it in the library](#) (e-book)
- PURVES, KLAJN. Neuroscience, Ed. Médica Panamericana, Madrid, 2016 (quinta edición). [Find it in the Library](#)

Atlas:



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- NOLTE J, ANGEVINE JB, El encéfalo humano en fotografías y esquemas. Elsevier mosby, 2009 ([english version available](#)). [Find it in the library](#)