



## Information about the subject

**Degree:** Bachelor of Science Degree in Speech and Language Therapy

**Faculty:** Faculty of Psychology

**Code:** 1171102 **Name:** Functional anatomy of the organs of speech and hearing II

**Credits:** 6,00 **ECTS Year:** 1 **Semester:** 2

**Module:** Basic Training

**Subject Matter:** Physiology **Type:** Basic Formation

**Field of knowledge:** Health sciences

**Department:** Speech Therapy

**Type of learning:** Classroom-based learning

**Languages in which it is taught:** Spanish

**Lecturer/-s:**

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## Module organization

### Basic Training

Subject Matter	ECTS	Subject	ECTS	Year/semester
Physiology	12,00	Functional anatomy of the organs of speech and hearing II	6,00	1/2
		Fundamentals of Neuroscience	6,00	1/2
Anatomy	6,00	Functional anatomy of the organs of speech and hearing I	6,00	1/1
Psychology	36,00	Basic Psychological Processes	6,00	1/1
		Developmental psychology	6,00	1/1
		Psycholinguistics	6,00	2/1
		Psychology of Education	6,00	2/2
		Psychology of language development	6,00	1/2
		Research Methodology	6,00	2/1
Clinical linguistics	6,00	Linguistics applied to speech and language therapy	6,00	1/1

## Recommended knowledge

The students will have previously taken the subject "Functional anatomy of the organs of the language and hearing I", so they will already be familiar with the anatomical nomenclature and have acquired a broad and unitary knowledge of the organization and functioning of the human body, absolutely essential for the understanding of this subject.



## Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1 To identify the different anatomical structures involved in hearing.
- R2 To know the respiratory system as a structure of fundamental importance for the elaboration of voice, speech and language.
- R3 To describe the functional anatomy of the oral and nasal cavities, larynx, and musculature involved in voice emission.
- R4 To understand the functional integration of the anatomical structures involved in hearing and the production of voice, speech and language.
- R5 To know and relate the macroanatomy of the nervous system with its functionality and some physiological characteristics.



## Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB3	Students have the ability to gather and interpret relevant data usually within their field of study to inform judgments that include reflection on relevant social, scientific or ethical			X	
CB4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist			X	
CB5	Capacity to develop those learning skills needed to undertake further studies with a high degree of autonomy				X

SPECIFIC		Weighting			
		1	2	3	4
CE1	Understand and integrate the biological foundations of Speech: Anatomy and Physiology				X
CE2	Understand and integrate the psychological foundations of Speech: language development, psychological development, Neuropsychology of language, basic processes and Psycholinguistics		X		
CE33	Final project involving transversally applicable material; to be carried out in association with different subjects		X		
CE37	Master the terminology that allows one to interact effectively with other professionals				X
CE47	Know and be able to integrate the biological (anatomical and physiological), psychological (and evolutionary development processes), linguistic and pedagogical foundations of speech therapy intervention in communication, language, speech, hearing, speech and non-verbal oral functions				X
CE54	Manage communication technologies and information			X	



TRANSVERSAL		Weighting			
		1	2	3	4
CT1	Use the techniques of verbal and nonverbal communication in order to optimize relevant communicative situations			X	
CT7	Having an open and flexible attitude to lifelong learning			X	
CT8	Know and use of technical advances in the exercise of their profession				X



## Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5	50,00%	Written exam
R1, R2, R3, R4, R5	35,00%	Practical work assignments assessment
R1, R2, R3, R4, R5	15,00%	Attendance and participation of in-person formative activities

### Observations

**WRITTEN TEST: 50%** Multiple choice tests (50%): multiple choice tests with one of the five possible correct answers. Provide a deeper understanding of the content learned by the student and prepare him to deal with this assessment model

**ASSESSMENT OF PRACTICES: 40%** Anatomical imaging tests (10%): exam in which the student must identify the anatomical structures previously observed in class Oral test (20%): oral exam in which the student answers the questions asked by the teacher, verbally explaining the knowledge he has acquired and allowing interaction with the teacher Final portfolio (10%): individually, students design a document presenting it to be evaluated by the teacher. It will consist of an anatomical atlas of the structures studied in the subject.

**ATTENDANCE AND PARTICIPATION: 15%**

Attendance to class (3%): It will never exceed 5% of the final grade. Class participation (12%): the teacher evaluates participation and progress in the acquisition of knowledge and skills by students during masterclasses and practices

**CRITERIA FOR THE GRANT OF HONOR REGISTRATION:** To obtain it, a grade equal to or greater than 9, participation in all class activities and final work of the subject with the highest grade of the class. Also, and in accordance with the general regulations, you can only give an honorary registration for every 20 students not for a fraction of 20, with the exception of the case of groups of less than 20 students in total, in which you can give an enrollment.

### Citation and Attribution Criteria

· Any use of AI tools must be **explicitly declared** in the submitted document (e.g., in a footnote or in an appendix).

· The **name of the tool**, the **purpose of its use** (e.g., grammar checking, idea organization, writing example), and the **specific section(s)** of the work in which it was used must be clearly indicated.

· The **responsible use of AI** will be assessed as part of the originality and academic integrity criteria.



## Attendance Requirements and Assessment Modalities

The course offers two assessment modalities:

### Ordinary Assessment

Students must attend at least **40% of classes** to be eligible for this modality. Assessment will be based on the activities carried out throughout the course, as specified in this syllabus.

### Single Assessment

Students who do **not reach the 40% minimum attendance**, and have **justified and properly documented reasons**, may request to be evaluated under the single assessment modality. This request must be submitted **in writing to the course instructor**, who will respond through the same channel.

The **single assessment** will generally consist of:

- **Written/theoretical exam (50%)**
- **Practical exam (50%)**

Both exams must be passed independently in order to calculate the final grade and pass the course.

In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with Distinction) may be awarded.

Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

## Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

- |    |                 |
|----|-----------------|
| M1 | On-Campus Class |
| M2 | Practical Class |
| M3 | Seminar         |



M4	Laboratory
M5	Individual Work
M6	Group Work
M7	Work Exhibition
M8	Clinical Case Analysis
M9	Prácticas en clínicas y centros





## IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS. Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge M1, M8	R1, R2, R3, R4, R5	24,00	0,96
PRACTICAL CLASSES. Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity M2, M8	R1, R3, R4	12,00	0,48
GROUP WORK EXHIBITION. Application of multidisciplinary knowledge M6, M7, M8	R4	6,00	0,24
SEMINAR. Supervised monographic sessions with shared participation M3	R4	6,00	0,24
OFFICE ASSISTANCE. Personalized and small group attention. Period of instruction and/or orientation carried out by a tutor to review and discuss materials and topics presented in classes, seminars, papers, etc. M5, M6, M8	R1, R2, R3, R4, R5	9,00	0,36
ASSESSMENT. Set of oral and/or written tests used in initial, formative or additive assessment of the student M5, M8	R1, R2, R3, R4	3,00	0,12
<b>TOTAL</b>		<b>60,00</b>	<b>2,40</b>



## LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
GROUP WORK. Group preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions. Work done on the university e-learning platform M6, M7, M8	R1, R2, R3, R4, R5	36,00	1,44
INDEPENDENT WORK. Student study: Individual preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions. Work done on the university e-learning platform M3, M5, M7, M8	R1, R2, R3, R4, R5	54,00	2,16
<b>TOTAL</b>		<b>90,00</b>	<b>3,60</b>



## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

### Theoretical contents:

Content block	Contents
1.- ANATOMY OF HEARING. PHYSICAL STUDY OF SOUND. HEARING.	<ul style="list-style-type: none"><li>•<b>Topic 1:</b> Outer and middle ear. Pinna. Ear canal. Tympanic membrane. Tympanic cavity. Middle ear bones: malleus, incus and stapes. Joints, muscles. Eustachian tube. Mastoid cells. Inner ear. Cochlea. Vestibule and semicircular canals. Internal auditory canal.</li><li>•<b>Topic 2:</b> Physical study of sound. Characteristics of sound waves. The outer and middle ear. Functions. Physiology of the eardrum-ossicular chain. The middle ear as impedance adapter. Air and bone transmission of sound.</li><li>•<b>Topic 3:</b> Transmission of sound waves, mechanical vibration cochlea. Organ of Corti: morphofunctional aspects. Tonotopic organization. Auditory pathway. Information systems and acoustic vestibular. Auditory cortical areas. Acoustic tract injuries.</li></ul>



## 2.- FUNCTIONAL ANATOMY OF RESPIRATION

•**Topic 4:** The respiratory system: general concepts on respiration. Organs of the respiratory system and their functional significance. Structure and morphology of the lower passageway: trachea, bronchi and bronchial tree. Contents of the thoracic cavity, pleura and pleural cavity. Lungs. Mediastinum.

•**Topic 5:** Muscles of respiration. Primary muscles of inspiration: the diaphragm. Anatomy of the diaphragm. Diaphragmatic mechanics. Accessory muscles of inspiration. Expiratory muscles: abdominal muscles. Expiration control. Accessory muscles of expiration.

•**Topic 6:** Respiratory Physiology. The measurement of respiration. Structure-function of the respiratory system. Respiratory cycle: pulmonary ventilation, pulmonary pressures and flows. Types of breathing: clavicular breathing, thoracic breathing, diaphragmatic breathing. Ventilation. Transport of respiratory gases. Control of breathing. Lung volumes and capacities. External and internal respiration.

## 3.- FUNCTIONAL ANATOMY OF PHONATION

•**Topic 7** - Anatomical elements of the larynx. Hyoid bone and laryngeal cartilages. Ligaments and membranes. Intrinsic and extrinsic muscles.

•**Topic 8** - Anatomy of the vocal folds. Body-cover model. Theories of phonation. Aero-elastic theory. Mechanism of phonation. Vocal cycle. Changes in the vocal folds by hormonal action throughout life.

•**Topic 9** - Laryngeal functions: Role in speech: vocal attack, termination, sustained phonation. The classification of the voices. Vocal registers. The chest voice and the passage of the voice: glottal fry, falsetto. Frequency, tone and pitch changes. Vocal intensity and intensity changes. Clinical considerations.



## 4.- FUNCTIONAL ANATOMY OF ARTICULATION AND RESONATION

·**Topic 10** – Concept of resonance and articulation.

Resonators and organs articulators (I). Cavities of the vocal tract. Nasal passages and sinuses. External nose. Nasal cavities: Regions of the nasal cavities. Sense of smell.

·**Topic 11** - Resonators and articulator (II). Oral cavity.

Tongue. Muscles of the tongue. Muscles of facial expression

·**Topic 12** - Resonators and articulators (III). Pharynx.

Division: rhino-pharynx, oropharynx, laryngopharynx.

Pharyngeal wall. Muscles of the soft palate.

·**Topic 13** - Source-filter theory. Physiology of articulation and resonance. Speech function: lips, mandible, tongue, velum. Development of articulatory ability. Development of the vocal tract. Coordinated articulation. The mouth as a resonant cavity: timbre, coverage and voice projection. The pharynx as a resonant cavity, *voce di gola*. The sinuses as a resonant cavity.

## 5.- FUNCTIONAL ANATOMY OF MASTICATION AND SWALLOWING

·**Topic 14** - Anatomy and physiology of mastication and swallowing: Temporo-mandibular joint. Masticatory muscles. Biomechanics of mastication. Dentition: dental development, dental occlusion. Salivary glands: parotid, submandibular and sublingual glands. Physiology of swallowing. Description of the three phases of swallowing.



## Temporary organization of learning:

Block of content	Number of sessions	Hours
1.- ANATOMY OF HEARING. PHYSICAL STUDY OF SOUND. HEARING.	7,00	14,00
2.- FUNCTIONAL ANATOMY OF RESPIRATION	6,00	12,00
3.- FUNCTIONAL ANATOMY OF PHONATION	6,00	12,00
4.- FUNCTIONAL ANATOMY OF ARTICULATION AND RESONATION	8,00	16,00
5.- FUNCTIONAL ANATOMY OF MASTICATION AND SWALLOWING	3,00	6,00



## References

### BASIC BIBLIOGRAPHY

- Cobeta I. et al. (2013). *Patología de la voz*. Ponencia oficial de la SEORL. Valencia. Marge Médica Books
- Gil-Carcedo, L. M. (2011). *Otología*. Ed Panamericana.
- Jackson- Menaldi, C. (2002). *La voz patológica*. Ed Panamericana.
- Jackson- Menaldi, C. (2005). *La voz normal*. Ed Panamericana.
- Le Huche (2003). *La Voz*. Tomos I y II. Ed Manson
- Marco, J; Manrique, M. (2014). *Audiología*. Ponencia oficial de la SEORL. CYAN, Proyectos Editoriales, S.A. Madrid.
- McCoy S., (2006). *Your Voice: An Inside View. Multimedia Voice Science and Pedagogy*. - Inside View Press, Princeton, NJ.
- Torres Gallardo B., Gimeno Pérez, F. (2008). *Anatomía de la voz*. Editorial Paidotribo.

### RECOMMENDED BIBLIOGRAPHY

- Basterra, J. (2004). *Otorrinolaringología y patología cervicofacial*. Barcelona. Masson
- Hoit, JD; Weismer, G; Story, B. (2021) *Foundations of Speech and Hearing: Anatomy and Physiology*. Plural Publishing Inc.
- McFarland. (2008). *Atlas de Anatomía en Ortofonía. Lenguaje y deglución*. Edit. Elsevier-Masson. Barcelona
- Netter, FH. (2019). *Atlas de Anatomía humana*. Elsevier.
- Palastanga, N. (2000). *Anatomía y movimiento humano. Estructura y funcionamiento*. Barcelona. Ed. Paidotribo
- Prado Calleros, H.; Arrieta Gómez, J.; Prado Abarca, A. (2012) *Práctica de la otorrinolaringología y cirugía de cabeza y cuello*. Editorial Médica Panamericana. Madrid
- Rousseau, B; Branski, R (2018). *Anatomy and Physiology of Speech and Hearing*. Thieme Medical Publishers Inc.
- Rouviere H. , Delmás A (2001). *Anatomía Humana. Descriptiva, topográfica y funcional*. Tomo I Cabeza y cuello. Ed Masson
- Seikel, AJ., (2010). *Anatomy and Physiology for Speech, Language, and Hearing*. Ed Singular
- Sobotta , *Atlas de Anatomía*. Edit Panamericana, Madrid. Atlas de consulta.
- Thibodeau G.A., Patton K. T. (2007). *Anatomía y Fisiología. Estructura y función del cuerpo humano*. Editorial Mosby. 6ª ed.

### RESOURCES ON LINE

- <https://www.free-anatomy-quiz.com/es/>
- <http://www.innerbody.com/htm/body.html>
- <https://webanatomy.umn.edu/>
- <http://www.getbodysmart.com/index.htm>
- <https://bcs.wiley.com/he-bcs/Books?action=index&bcsId=1026&itemId=0471366927>



- <http://www.bartleby.com/107/>
- <http://www.meddean.luc.edu/lumen/meded/grossanatomy/dissector/mml/index.htm> MUSCLES
- <http://www.iqb.es/cbasicas/anatomia/musculos/musculos1.htm> MUSCLES IN SPANISH
- <http://www.ugr.es/~dlcruz/index.htm> IN SPANISH
- <http://www9.biostr.washington.edu/da.html>
- <http://www.youtube.com/user/leonardocoscarelli> PROFESSOR LEONARDO COSCARELLI
- <http://es.aclandanatomy.com/> CADAVERIC DISSECTIONS
- <http://www.uni-mainz.de/FB/Medizin/Anatomie/workshop/Klinisches/Clinic.html>
- <https://www.artnatomia.net/es/index.html>
- <http://www.otorrinoweb.com>