



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: -

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: 35%Anatomical imaging tests (10%): exam in which the student must identify the anatomical structures previously observed in classOral test (10%): 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 teacherFinal portfolio (15%): 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.



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
TOTAL		60,00	2,40



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
TOTAL		90,00	3,60



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.

•**Topic 1:** 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.

•**Topic 2:** 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.

•**Topic 3:** 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.



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
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- 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>