Teaching Guide				
Identifying Data				2023/24
Subject (*)	Physiology of the Organs of Hearing and Speech		Code	652G04006
Study programme	Grao en Logopedia			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	Basic training	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Fisioterapia, Medicina e Ciencias Biomédicas			
Coordinador	Labra Pinedo, Carmen de	E-mail	c.labra@udc.es	
Lecturers	Cudeiro Mazaira, F.Javier	E-mail	javier.cudeiro@udc.es	
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Web	https://pdi.udc.es/es/File/Pdi/A329E			
General description	Second semester, after completing the course on Anatomy of Hearing and Language Organs in the first semester. Class materials may contain English text. The articles that students will have to work on will be in English. The subject is subject to the English Friendly program, which means that some of the content may be in English.			

Study programme competences	
Code	Study programme competences
A1	Coñecer e integrar os fundamentos biolóxicos da Logopedia: a Anatomía e Fisioloxía.
A2	Coñecer e integrar os fundamentos psicolóxicos da Logopedia: o desenvolvemento da linguaxe, o desenvolvemento psicolóxico, a Neuropsicoloxía da linguaxe, os procesos básicos e a Psicolingüística.
A3	Coñecer e integrar os fundamentos lingüísticos da Logopedia: Fonética e fonoloxía, morfosintaxe, semántica, pragmática, sociolingüística.
A6	Coñecer a clasificación, a terminoloxía e a descrición dos trastornos da comunicación, a linguaxe, a fala, a voz e a audición e as funcións orais non verbais.
A7	Coñecer, recoñecer e discriminar entre a variedade das alteracións: os trastornos específicos do desenvolvemento da linguaxe, trastorno específico da linguaxe, retrasos da linguaxe, trastornos fonéticos e fonolóxicos; os trastornos da comunicación e a linguaxe asociados a déficit auditivos e visuais, o déficit de atención, a deficiencia mental, o trastorno xeneralizado do desenvolvemento, os trastornos do espectro autista, a parálise cerebral infantil e as pluridefiencias; os trastornos específicos da linguaxe escrita; as discalculias; as alteracións no desenvolvemento da linguaxe por deprivación social e as asociadas a contextos multiculturais e plurilingüismo; os trastornos da fluidez da fala; as afasias e os trastornos asociados; as disartrias; as disfonías; as disglosias; as alteracións da linguaxe no avellentamento e os trastornos dexenerativos; as alteracións da linguaxe e a comunicación en enfermidades mentais; o mutismo e as inhibicións da linguaxe; as alteracións das funcións orais non verbais: deglución atípica, disfagia e alteracións tubáricas.
A10	Realizar a avaliación das alteracións da linguaxe nos trastornos específicos do desenvolvemento da linguaxe: trastorno específico da linguaxe, retrasos da linguaxe, trastornos fonéticos e fonolóxicos; os trastornos da comunicación e a linguaxe asociados a déficit auditivos e visuais, o déficit de atención, a deficiencia mental, o trastorno xeneralizado do desenvolvemento, os trastornos do espectro autista, a parálise cerebral infantil e as pluridefiencias; os trastornos específicos da linguaxe escrita; as discalculias; as alteracións no desenvolvemento da linguaxe por deprivación social e as asociadas a contextos multiculturais e plurilingüismo; os trastornos da fluidez da fala; as afasias e os trastornos asociados; as disartrias; as disfonías; as disglosias; as alteracións da linguaxe no avellentamento e os trastornos dexenerativos; as alteracións da linguaxe e a comunicación en enfermidades mentais; o mutismo e as inhibicións da linguaxe; as alteracións das funcións orais non verbais: deglución atípica, disfagia e alteracións tubáricas.
A11	Redactar un informe de avaliación logopédica.
A12	Realizar unha avaliación tras a intervención.
A14	Coñecer as funcións da Intervención logopédica: prevención, educación, reeducación, rehabilitación e tratamento.
A29	Adquirir a formación práctica para o traballo individual, grupal, cooperativo e de mediación con facilitador.

A31	Adquirir o desenvolvemento os recursos persoais para a intervención: habilidades sociais e comunicativas, habilidades profesionais, avaliación da propia actuación profesional, técnicas de observación, técnicas de dinamización ou toma de decisións.
A32	Utilizar tecnoloxías da información e da comunicación.
B1	Acceso, selección e xestión das fontes de información relevantes para a práctica profesional.
B2	Aplicar un pensamento crítico, lóxico e creativo.
B4	Aprender a aprender.
B5	Aprender autonomamente, e motivarse para facelo de forma continuada.
B6	Capacidade de adaptarse aos cambios.
B7	Capacidade de análise e síntese.
B9	Capacidade de organizar e planificar.
B12	Comunicarse de maneira efectiva nun contorno de traballo.
B13	Coñecer e manexar as novas tecnoloxías da comunicación e da información.
B14	Destreza e empatía nas relacións interpersoais.
B16	Resolver problemas de forma efectiva.
B17	Saber expresarse en público.
B18	Ser creativo no exercicio da profesión.
B19	Ter compromiso ético.
B20	Ter iniciativa e espírito emprendedor.
B21	Tomar decisións con autonomía e responsabilidade.
B22	Traballar de forma autónoma con iniciativa.
B23	Traballar de forma colaborativa.
B24	Traballar en equipo e, de ser o caso, de forma interdisciplinar.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.

Learning outcomes			
Learning outcomes	Study programme competences		
Proporcionar os coñecementos necesarios para comprender e utilizar os métodos básicos empregados na exploración funcional de diferentes órganos e sistemas.	A1 A2 A6 A11 A14 A29 A31	B5 B20	
Coñecer e comprender os distintos mecanismos fisiológicos que contribúen ao mantemento da homeostasis no ser humano.	A1 A2		
Ter unha visión integrada do funcionamento do organismo podendo relacionar a actividade dos diferentes órganos e sistemas	A1 A2 A3 A7 A10 A12		

Proporcionar os coñecementos necesarios para comprender e utilizar os métodos básicos empregados na exploración funcional de diferentes órganos e sistemas.	A1 A2 A6 A7 A11	B2	
Coñeza, comprenda e utilice o método científico.Desenvolver capacidade crítica, filosófica e creativa e capacidade de razoamento.	A32	B1 B2 B4 B6 B12 B17 B18 B19 B21 B23 B24	C6
Desenvolva a capacidade de aplicar os coñecementos e métodos científicos ao exercicio da súa actividade profesional	A12	B1 B2	C1 C2 C3 C6
Adquira capacidade de xestión da información aplicándoa á resolución dos problemas que se lle poidan expor no seu ámbito profesional. Adquira habilidades de consulta bibliográfica. Adquira coñecemento e manexo das novas tecnoloxías.	A12	B1 B2	C1 C2 C3 C6
Adquira a capacidade de síntese para expor de forma clara e concisa a información obtida sobre un tema. Sexa capaz de tomar decisións e asumir a responsabilidade da devandita decisión.		B2 B7 B9 B12 B13 B14 B16 B17 B19 B22 B23 B24	

Contents	
Topic	Sub-topic

Theoretical Classes: I. General Physiology (1.8 ECTS) Rationale and Context: This section encompasses the study of general functions that are common to all cells, as well as general aspects of physiology that will appear repeatedly throughout the course.	Functional organization of the human body. Internal environment. Homeostasis. Physiology of organs and systems. Contribution of different apparatuses and systems to the organism's function. Functions of the cell membrane. Transport of ions and molecules across the cell membrane. Membrane receptors, second messengers, and intracellular signaling. Electrical properties of the membrane. Ionic equilibria. Equilibrium potential. Nernst equation. Resting membrane potential. Passive properties of nerves. Excitable membranes. Action potential. Ionic mechanisms. Ion channels. Conduction of the action potential. Synaptic transmission. Types of synapses. Neuromuscular junction. Phenomena occurring during synaptic transmission. Activation of the postsynaptic cell. Synaptic modulation. Neuronal integration. Neurotransmitters. Muscle contraction. Types of muscles. Skeletal muscle. Molecular mechanisms of muscle contraction. Energetics of muscle contraction. Excitation-contraction coupling. Tetanus and fatigue. Motor unit. Smooth muscle. Control systems of organism functions: nervous and hormonal mechanisms.
II. Respiratory and Phonatory Physiology (1.3 ECTS) Rationale: This section focuses on the various functions of the respiratory system, including the physiology of phonation and swallowing.	Organization of the Respiratory and Circulatory Systems. General functions and organization of each segment of both systems. Physiology of the airways. The respiratory membrane and gas exchange at the pulmonary level. Factors affecting gas diffusion across the respiratory membrane. Respiratory muscles. Mechanics of respiratory movements. Lung volumes and capacities. Alveolar ventilation. Elastic properties of the lung. Alveolar surface tension: pulmonary surfactant. Pulmonary pressures and resistances. Respiratory work. Control of respiration: respiratory centers. Nervous control of respiration. Pulmonary reflexes. Chemical control of respiration. Physiology of the orofacial organs. Physiology of the larynx. Physiology of resonating and articulating organs. Swallowing: mechanisms and nervous control. Salivary secretion: glands, functions, and composition of saliva. Regulation of salivary secretion.

III. Neurophysiology (2.4 ECTS) Rationale and Context: This section focuses on the physiology of the sensory and motor nervous system, as well as the higher functions of the central nervous system (CNS). Sensory physiology is presented systematically according to different modalities, with special emphasis on the process of hearing. The motor nervous system is organized based on levels of function (spinal and supraspinal control). Finally, a few topics are dedicated to the study of higher functions of the CNS in general, with a specific focus on language.	Functional Organization of the Nervous System. Central Nervous System and Peripheral Nervous System. Mechanisms of Brain Protection and Nutrition. Cells of the Nervous System: Neurons and Glia. Physiology of the Sensory Systems: Generalities. Sensations and Perceptions. Attributes of Sensations. Sensory Modalities. Types of Sensory Receptors. Transduction of Stimulus. Encoding of Sensory Information. Sensory Circuits. Physiology of the Ear I: Principles of Acoustics. Nature of Sound. Physical Properties of Sound. Intensity, Pitch, and Frequency. External Ear and Middle Ear. Physiology of the Ear II: Inner Ear. Basilar Membrane. Transduction in Hair Cells. Frequency Discrimination. Tonotopic Organization. Inner Hair Cells. Outer Hair Cells. Auditory Pathway. Central Processing of Auditory Information. Encoding Sound Frequency and Intensity. Sound Localization in Space. Auditory Evoked Potentials. Sensory Pathologies: Hearing Loss. Cochlear Implants and Cortical Implants. Vestibular Function. Vestibular Stimuli. Otolith Organs. Semicircular Canals. Transduction in Vestibular Hair Cells. Vestibular Reflexes. General Organization of Motor Systems. Types of Movement. Regulation of Contraction Force. Muscle Spindle. Golgi Tendon Organ. Motor Functions of the Spinal Cord. Reflex Movements. Locomotion. Motor Functions of the Brainstem, Basal Ganglia, Cerebellum, and Cerebral Cortex. Corticospinal and Corticobulbar Tracts. Cerebellum: Functional Organization. Functions in Movement Control. Higher Functions of the Nervous System. Associative Areas. Evolution and Development of Language. Brain Areas Related to Language. Broca's Area. Wernicke's Area. Other Language-Related Cortical Areas. Dominant Hemisphere. Bilingualism. Sign Language. Aphasias. Types of Aphasias. Broca's Aphasia. Wernicke's Aphasia. Mixed Aphasias. Other Aphasias. Causes of Aphasias.
IV. Techniques for Studying the Nervous System (0.5 ECTS) Rationale: All the techniques explained in this section are commonly used in clinical practice and research. Although this block is located at the end of the program, it will be interspersed throughout other topics as references to these techniques arise.	Electroencephalogram (EEG) and Evoked Potentials. Imaging Techniques: Positron Emission Tomography (PET) and Functional Magnetic Resonance Imaging (fMRI). Magnetoencephalography (MEG) and Transcranial Magnetic Stimulation (TMS).

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Objective test	A1 A7 A32 B1 B2 B7	2	0	2
Guest lecture / keynote speech	A1 A10 A12 A14	21	63	84
Events academic / information	A7 A10 A31 A32 B2 B9 B12 B14 B18	2	0	2
Laboratory practice	A1	4.5	4.5	9
Collaborative learning	A10 A29 A31 B1 B2 B4 B5 B6 B7 B9 B12 B13 B14 B16 B17 B19 B20 B22 B24 C3 C6	13	26	39
Workbook	A1 A2 A3 A6 A7 A11 A29 A32 B7 B9 B19 B20 B21 B23 B24 C1 C2 C3 C6	1.5	10.5	12

Personalized attention		2	0	2
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Objective test	The final exam will be conducted at the end of the course and will account for 70% of the final grade.
Guest lecture / keynote speech	Lecture, where the theoretical foundations of the course will be explained.
Events academic / information	Attendance and preparation of a report on various scientific dissemination activities.
Laboratory practice	Practical classes in which students will perform EEG and auditory evoked potentials experiments. Conducting spirometry tests.
Collaborative learning	Seminars: In these seminars, students will work in small groups to solve problems related to the main topics covered in the lectures. Attendance to the seminars is mandatory, and its influence on the final grade will be complemented by the students' active participation, which will be evaluated based on their responses to the problems posed and their written answers to potential questions raised by the professor. English Language Proficiency: In order to familiarize students with the use of English, which is one of the transversal skills of the program, a proposal will be made on the first day of class to form one of the three interactive groups conducted entirely in English. This proposal will be implemented only if a minimum number of students is met, ensuring the smooth functioning of the interactive group without affecting the other groups. Presentation of Student Works: Each student is required to prepare a presentation based on a scientific article related to the subject matter of the course. The article will be provided by the professor, and the student's work on the presentation will be supervised by the professor. All presentation materials must be submitted electronically in digital format. Note: Please keep in mind that these translations are done to the best of my ability, but it's always a good idea to have them reviewed by a human translator for accuracy.
Workbook	Discussions on practical applications of physiology.

Personalized attention	
Methodologies	**Description**
Laboratory practice	Personalized attention primarily involves direct interaction with the student in the various practical activities, aiming to individually assess their deficiencies and needs. Additionally, through virtual tutorials, students can make inquiries to the faculty almost any day of the week during working hours.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Laboratory practice	A1	The students, in addition to attending the different proposals, must participate, this participation will be reflected in different documents (for example, practice notebooks, problem solving, answers to questions posed in class...) that will be evaluated and valued by the teacher.	15
Objective test	A1 A7 A32 B1 B2 B7	This test will account for 70% of the final grade.	70

Collaborative learning	A10 A29 A31 B1 B2 B4 B5 B6 B7 B9 B12 B13 B14 B16 B17 B19 B20 B22 B24 C3 C6	Completion of assignments and presentation by students. Each student must complete a mandatory assignment, which will consist of presenting a scientific article to their peers related to the subject of the course. The article will be provided by the professor. The completion of this assignment will be supervised by the professor. The assignment will be given to students in the early days of the course, and a specific date for the presentation will be assigned towards the end of the course. The presentation will last for 10 minutes, followed by a 5-minute question and answer session. It will account for 15% of the final grade. Completion of this assignment is mandatory to pass the course.	15

Assessment comments
Assessment Systems: First and Second Opportunity: Mixed exam covering the entire syllabus of the subject (70% of the final grade) and supervised assignments (30%). Advanced Opportunity: Mixed exam covering the entire syllabus of the subject.The mixed exam may consist of any of the following modalities and/or a combination of several:Essay Questions: Open-ended questions requiring development.Multiple-Choice Questions (with one or multiple correct answers).Ordering Questions.Short Answer Questions.Matching Questions.Fill-in-the-Blank Questions.Association Questions.Passing the mixed exam is essential to pass the subject, meaning a minimum of 5 points out of a maximum of 10 must be obtained. If the final exam (mixed exam) is not passed, the grade for the supervised assignments will not be added, and the final grade for the subject will be based solely on the final exam.Partial Enrollment: Students with partial enrollment will be evaluated on an individual basis, taking into account each case. Students are recommended to contact the professor as soon as possible.Not Present: Any student who does not take the mixed exam will be considered "not present."Honors Enrollment: It will be awarded to students who achieve an outstanding grade and have the highest scores.Engaging in fraudulent activities during exams or assessments (copying, plagiarism, etc.) will result in an automatic failing grade for the corresponding subject.Grading System: Numeric scale from 0 to 10, with 10 being the highest grade and 5 indicating a passing grade. The grading system will be expressed numerically in accordance with the provisions of Article 5 of Royal Decree 1125/2003 of September 5th (Official State Gazette, September 18th), which establishes the European credit transfer and accumulation system (ECTS) and the grading system for official university degrees with national validity. Grading scale: 0-4.9=Fail, 5-6.9=Pass, 7-8.9=Good, 9-10=Excellent, 9-10=Honors (with distinction).According to article 11, section 4 b) of the Disciplinary Regulations for Students at UDC:Qualification of "fail" in the examination in which the offense was committed and respect for the subject in which the offense was committed: the student will be given a "fail" grade (numerical grade 0) in the corresponding examination of the academic year, whether the offense is committed in the first attempt or in the second. To do this, the student's grade will be modified in the first attempt transcript, if necessary.

Sources of information	
Basic	- SILVERTHORN (2014). FISIOLOGIA HUMANA. UN ENFOQUE INTEGRADO. PANAMERICANA - STUART IRA FOX (2017). FISIOLOGÍA HUMANA. MCGRAW-HILL - Tortora-Derrickson (2014). Principios de anatomía y fisiología. PANAMERICANA - E.R. Kandel, J.H. Schwartz (2000). Principles of Neural Science . Elsevier - C Bhatnagar y OJ Andy Ed Masson (1997). Neurociencia para el estudio de las alteraciones de la comunicación. Masson-Wilkins - RJ Love y WG Webb (1998). Neurología para los especialistas del habla y del lenguaje. Panamericana
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Anatomy of the Organs of Hearing and Speech/652G04001
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

To contribute to an immediate sustainable environment and fulfill the objective of Action 5: "Healthy and sustainable environmental and social teaching and research" of the "Green Campus Ferrol Action Plan":1. All documentary assignments in this subject should be submitted digitally through Moodle, eliminating the need for printing.2. The importance of ethical principles related to sustainability values should be considered in personal and professional behaviors.3. Full integration of students who may experience difficulties due to physical, sensory, psychological, or sociocultural reasons, ensuring equal and beneficial access to university life.4. Efforts will be made to identify and modify sexist prejudices and attitudes, influencing the environment to promote respect and equality. Any adverse situations related to gender will be addressed and corrected.5. Students are expected to have a command of language skills, including oral and written expression. Therefore, it is mandatory to correct spelling, grammar, and vocabulary (spelling, accentuation, punctuation) in assignments and exams as an essential requirement to pass the subject.Recommendations for Gender Equality:1. In accordance with applicable regulations for university education, gender perspective should be incorporated into this subject (using non-sexist language, utilizing bibliography from authors of all genders, promoting the participation of male and female students in class, etc.).2. Efforts will be made to identify and modify sexist prejudices and attitudes, influencing the environment to promote respect and equality.3. Situations of gender discrimination should be identified, and actions and measures will be proposed to address and correct them.