

**Biological Changes During the Vital Cycle:  
Implications for speech therapy**

Code: 101703  
ECTS Credits: 6

**2025/2026**

Degree	Type	Year
Logopedia	OB	2

## Contact

Name: Judit Pampalona Sala

Email: judit.pampalona@uab.cat

## Teachers

Guillermo Garcia Alias

Christelle Serra Le Cheualier

Judit Pampalona Sala

Alejandro Gella Concustell

## Teaching groups languages

You can view this information at the [end](#) of this document.

## Prerequisites

There are no official prerequisites for this subject. However, it is recommended that students have passed the subjects of the first course "*Anatomy and physiology of the voice and speech organs (101701)*" and "*Anatomy and physiology of the nervous system (101700)*".

## Objectives and Contextualisation

This course is taught during the first semester of the second year, after having studied in the first year, the subjects "*Anatomy and physiology of the voice and speech organs (101701)*" and "*Anatomy and physiology of the nervous system (101700)*" that cover the different relevant systems in a situation of normality.

The subject "Biological changes during the life cycle: implications for speech therapy" aims for students to acquire basic learning of the processes and mechanisms of development, growth and human body changes along the life cycle (from the embryonic period to old age). Particular emphasis is placed on those systems which are relevant for speech therapists, such as the nervous system and organs related to speech, voice, hearing and swallowing.

The course is divided into two modules: the first refers to the prenatal period and the second to the postnatal period.

## LEARNING OBJECTIVES

### Module 1: Prenatal period

- Describe the development of male and female gametes, and explain the process of fertilization
- Describe the genetic control of development. Enumerate the phases of human prenatal development.
- Describe the most significant changes in each of the stages of human prenatal development. Classify specimens according to fetal and embryonic stages of development.
- Identify the germ layers and relate them to their derivatives
- Describe the most significant features of development and fetal behavior
- Explain in chronological order the development of the nervous system
- Explain the changes that lead to the structuring of the neural tube and the characteristics of the brain vesicles and the spinal cord
- Describe the embryonic origin of the ear and its main malformations
- Explain the processes that lead to the formation of the face from the different primordia that constitute the face.
- Explain the mechanisms of development that lead to the formation of the anatomical elements that constitute the phonatory apparatus (mouth, lips, soft and hard palate, nostrils, pharynx, larynx, trachea, bronchii and lungs)
- Relate birth defects (affecting the main processes and structures studied during the course) with the alteration of the causal developmental mechanisms.
- Describe the development of the pharyngeal apparatus and its derivatives
- Apply knowledge to the interpretation of symptoms and signs of common congenital and developmental abnormalities

### Module 2: Postnatal period

- Describe the physiological condition according to the degree of maturity of the different systems of the human body, in particular the nervous system and the organs involved in voice and speech, at the different stages of the life cycle.
- Understand the different forms of intercellular communication that allow growth and maturation of the organism.
- Understand the role of the endocrine system, identify and describe the mechanism of action of the different hormones that are involved in postnatal growth and maturation of the body.
- Describe the events that mark the neural development after birth, such as synaptic plasticity, synaptogenesis, and myelination.
- Describe the sensori-motor changes occurring during postnatal development and ageing.
- Describe the variations in brain development and higher functions throughout postnatal development, adolescence and aging.
- Describe the factors that govern body maturation during infancy and adolescence periods
- Identify the normal evolution of the voice, and the differences by sex and age.
- Analyze and categorize the functional changes that occur during growth and aging in the organs of voice and speech.
- Assess and determine the factors involved in the postnatal growth of the larynx and the speech organs and the resulting functional changes.

### Justification:

This subject provides the student of speech therapy with the basic knowledge about the biological changes that occur throughout the life in the organs and systems of the body. Knowing the stages of normal development will serve to define the baseline framework to assess the person's situation and progress, establish a rigorous differential diagnosis, and plan the most optimal treatment.

The function of the organs related to speech, voice, hearing and swallowing is heavily influenced by the history of the person, i.e. the genetic and environmental factors that shape their anatomy, the development of the necessary connections with the nervous system, and the learning and training of the function during the life. In many occasions, abnormal development of embryo, altered growth of the child or biological changes at later

ages may lead to important problems requiring logopedic interventions. Therefore, by knowing how the individual has been transformed during the different periods of life, we can correctly identify the biological situation of these structures and determine the goal and efficacy of the therapy.

For this purpose, the course is dedicated to offer the student of speech therapy the tools to understand the evolution of a subject from conception to death so the student will be able to recognize normality and identify more accurately pathological situations. The course is divided in two modules: prenatal and postnatal, which deal with the molecular, cellular and physiological mechanisms occurring before and after birth, respectively. Fundamental concepts on cell biology and genetics will be reviewed at the beginning of the course for better understanding of embryonic and fetal development mechanisms.

## Learning Outcomes

1. KM40 (Knowledge) Identify changes in language, speech, voice, hearing and swallowing throughout the life cycle and their biological bases.
2. KM41 (Knowledge) Describe the stages and processes that take place in the embryo and foetus during the normal development of the nervous system and of the organs of speech, voice and swallowing, as well as their regulation.
3. KM42 (Knowledge) Describe the main processes that take place during postnatal development, maturation and aging of the nervous system and of the organs of speech, voice and swallowing.
4. KM43 (Knowledge) Identify alterations in the development of the nervous system and the speech, voice and hearing organs and their manifestations in various speech therapy pathologies.
5. SM32 (Skill) Design actions to prevent or reduce the impact of developmental disorders on language, speech, voice and swallowing, based on case studies.

## Content

### MODULE 1- PRENATAL DEVELOPMENT

Lectures: This block has 12 sessions of 1.5h (4 of biology and 8 of embryology) covering the following topics:

Unit 1. Cellular division: Mitosis, meiosis, spermatogenesis, oogenesis and fertilization.

Unit 2. Cellular mechanisms of development: cellular growth, determination and differentiation of the cell, cell proliferation, apoptosis (programmed cell death), cell migration, regulation and intensification of transcription during development and intercellular communications.

Unit 3. Genetic control of development: general characteristics and examples of implicated genes: transcription factors- Genes HOX and PAX; signal molecules- SHH.

Unit 4. First week of gestation: cleavage divisions and the migration of the embryo through the Fallopian tube, the blastocyst.

Unit 5. Second week of gestation: implantation, bilaminar embryonic disc, formation and fate of the embryonic layers. Abnormalities

Unit 6. Third week of gestation: gastrulation (embryonic disc, primitive streak, primitive node), notochord, trilaminar embryo. Derivates of the germ layers.

Unit 7. The fourth to eighth week. Embryo folding. Organogenesis.

Unit 8. Fetal development

Unit 9. Development of the nervous system: neurulation, reorganization of the neural tube, early brain structure. Central nervous system malformations

Unit 10.- Development of the pharyngeal apparatus: pharyngeal grooves, pharyngeal arches, pharynges pouches.

Unit 11.- Development of the face: nose and nasal cavity, oral cavity, palate and tongue. Main malformations.

Unit 12.- Development of the eyes: optic vesicles, optic cup and lens placode. Main malformations.

Unit 13. Development of the ears: inner ear, middle ear and outer ear. Malformations that affect hearing loss

Unit 14.- Development of respiratory system: upper respiratory tract and lower respiratory tract, lung development stages. Malformations of the larynx.

Seminars: In this learning activity the students will be divided into small groups to promote interaction with the teaching staff.

Sem 1- Genetics: Students will work in groups looking for information on genetic diseases involved in the malformations of the speech, voice and hearing organs. Each group of students will have to present a summary of their conclusions (EV3).

Sem 2- Earlyembryonic development: Students will work in small groups to reinforce the theoretical content. At the beginning or the end of the seminar, the students will have to answer an exam corresponding to EV4.

Sem 3.- Organogenesis: Students will work in small groups to reinforce the theoretical content. At the beginning or the end of the seminar, the students will have to answer an exam corresponding to EV4.

Sem 4.- Anomalies in thedevelopment of the prenatal period: Students will work in small groups to reinforce the theoretical content. At the beginning or the end of the seminar, the students will have to answer an exam corresponding to EV4.

## MODULE 2 - POSTNATAL PERIOD

Lectures: This block has 9 sessions covering the following topics:

Unit 15. General concepts on growth and postnatal development: Differences between growth and development, factors that influence growth, measurement and assessment of growth.

Unit 16. Physiology of growth: The physiological process of growth, homeostasis and feedback systems.

Unit 17. Hormonal regulation of growth: Hormonal control of somatic growth, types of hormones and classification, growth hormone (GH), thyroid hormones and their involvement in postnatal development.

Unit 18. Growth and development of the nervous system: Neuronal regeneration and compensatory mechanisms, synaptogenesis, neural plasticity and myelination during life.

Unit 19. Growth and development after birth: Physiological adaptation to the birth process, cardiorespiratory changes at birth, swallowing function during the first year of life, neurological development and the speech function after birth and later years.

Unit 20. Biological changes during adolescence: Sexual hormones, puberty and adolescence, development during adolescence, maturation of the oropharynx and larynx during adolescence, physiological changesof speech during adolescence.

Unit 21. Maturation anddevelopment of the voice and speech function during adulthood: physiological changes of voice and speech,environmental-related and other common variations of the normal voice function.

Unit 22. Biological changes during ageing: the ageing process, physiological, molecular and cellular changes of ageing.

Unit 23. Ageing of organs and systems: ageing of the cardiorespiratory system, ageing of the nervous system, ageing of the language and speech function.

Seminar: Students have a seminar consisting of a group oral presentation and interactive discussion

Sem 5.- Changes in voice, swallowing, speech, and language during the postnatal period. (EV5)

## Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	31.5	1.26	
Seminars	14	0.56	
Type: Supervised			
Tutorials in person and virtual	6	0.24	
Type: Autonomous			
Drafting of works	15	0.6	
Evaluation	8.5	0.34	
Reading of texts	20	0.8	
Search for documentation	15	0.6	
Study	36	1.44	

Lectures: Systemized lectures on subject topics, emphasizing those concepts related to speech therapy practice. Students acquire the basic scientific knowledge of the subject by attending theory classes, which must be complemented by personal and independent study. Each lecture lasts 1.5 hours.

Seminars: The knowledge acquired in the lectures and self-study will be applied to solve clinical cases. The seminars involve active student work in small groups supervised by the teacher.

Virtual classroom: The virtual classroom (*Campus Virtual*) will encourage continuous learning of the students through the exchange of relevant scientific articles, videos, links, etc., and discussions.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Assessment

### Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
EV1, EV4-Written tests	62	4	0.16	KM41, KM42, KM43

EV2,EV3-Cooperative learning (group work)	18	0	0	KM43, SM32
EV5-Oral presentations	20	0	0	KM40, KM42, KM43, SM32

**PARTIAL EXAMS:** The competencies of the subject are assessed by means of two partial exams: the first partial corresponds to the prenatal module and the second partial to the postnatal module. Students will have eliminated the subject when the grade point average is greater than or equal to 5.0.

1st part (prenatal module):

- Represents 65% of the grade of the subject.
- The competences of this module will be assessed by:
  - EV1: written questions (first assessment period)
  - EV2: test in the classroom during seminar 2, 3, and 4.
  - EV3: report of the group project of seminar 1
- The grade for this part will be the result of:
  - EV1- 60% of the mark of this part will correspond to a written exam (test or non-test). The characteristics of the exam and the number of questions will be given in the exam call. This exam will focus on the contents of the whole subject (theory and seminars) of the prenatal module.
  - EV3- 10% of the mark of this partial will correspond to the mark obtained from seminar 1 (Biology part)
  - EV2- 30% of the mark of this partial will correspond to the mark obtained from the seminars 2,3,4 (part Embryology)
  - To eliminate this partial it is essential: 1) to obtain a minimum grade of 4.00 in each EV (1, 2 and / or 3), 2) that the weighted grade of the three parts is equal to or greater than 5.0  $60\% + 10\% + 30\% \geq 5.0$
  - The partial will not be eliminated unless these two premises are met. Students must retake ALL EV with a grade  $<5.0$ .

2nd part (postnatal module):

- Represents 35% of the grade of the subject.
  - EV4: written questions about the theory topics (second assessment period).
  - EV5: Exposition and discussion of the work for the postnatal seminar.(sem.5)
- The grade for this part will be the result of:
  - EV4- 65% of the mark of this part will correspond to a written exam (test or non-test). This exam will focus on the contents of the whole subject (theory and seminars) of the postnatal module.
  - EV5- 35% of the mark of this partial will correspond to the exposition of the cases treated in the seminar 5 (part Physiology)
- To eliminate this partial it is essential: 1) to obtain a minimum grade of 4.00 in each EV (4, and / or 5), 2) that the weighted grade of the two EV is equal to or greater than 5.00 ( $65\% + 25\% \geq 5.0$ )
- The partial will not be eliminated unless these two premises are met. Students must retake ALL EV with a grade  $<5.0$ .

RECOVERY EXAM (Final):

All EVs are recoverable. Students who have failed a subject in the partial assessments will not be required to take this assessment.

Must take the resit exam (final):

- Students who want to raise a grade for a grade (must notify the coordinator at least 15 days before the exam and must give up the grade for the grade they want to grade).
- Students who have not taken 1 or 2 partial exams.

- Students who have not eliminated the subject in 1 or in the 2 partial exams. For each part not eliminated, only the part of the E (1, V 2 and / or 3) will be presented with a mark lower than 5.00.

Students who are required to apply for both part-timers will retake the first part and then the second part. They will therefore have a recovery note for each partial.

The calculation will be as follows, either with the marks obtained in the partials or with the marks of the resit exam:

- 1st partial grade = 60% + 10% + 30% (minimum grade of 4.0 in each EV).
- 2nd partial grade = 65% + 35% (minimum grade of 4.0 in each EV).
- Subject grade = prenatal module grade (65%) + postnatal module grade (35%). (minimum grade of 4.0 in each module).

Type of Return	EV & TYPE	WEEK
Written	EV1 i 4: number	9 i 20, respectively
Digital tool	EV3: number	9
At the classroom	EV2 i 5: number	9 i 20, respectively
Tutor	For all the EV	Flexible, previous agreement with the corresponding teacher

**MODALITY ONE SINGLE EXAM:** The students that have chosen this modality will have to take the exam at the same date and time scheduled for the second partial exam. This single exam will evaluate all the theory given in the lessons, including the seminars. The work corresponding to EV3 will be handled on the exam's day. The work subject will be defined 15 days before the deadline. This work will be handled the same day of the Single Exam.

Students following this modality with a score on the single exam <5.0 or students aiming to get a better score, they should make the Recovery Exam (Final Exam).

**REPEATING STUDENTS:** The grade for any part from one year to the next is NOT saved. The subject does NOT DIFFERENTIATE between repeating and non-repeating students.

UNIQUE EVALUATION IS REQUESTED ELECTRONICALLY (E-FORM) IN THE SPECIFIED PERIOD (more information on the Faculty's website);

Students who have chosen this option will not be able to be evaluated before the date of the unique evaluation, nor can they complete the corresponding work for EV3. The day of the unique evaluation will coincide with the second partial exam. The unique evaluation exam will cover all the material taught (EV1, 2, 4, and 5). The EV3 assignment must be submitted on the day of the exam. The topic of the assignment will be defined 15 days before the unique evaluation exam and will be submitted on the day of the exam. The weight of each evaluation will follow the same guidelines as continuous assessment.

Students with a grade <5.0 in the unique evaluation or who wish to improve their grade must take the final exam.

**REPEATING STUDENTS:** No partial exam grade is carried over from one year to another. The subject does NOT differentiate between repeating and non-repeating students.

Assessment guidelines: <https://www.uab.cat/web/estudiar/graus/graus/evaluacions-1345722525858.htm>

Students who have submitted evidence of learning with a weight equal to or greater than 4 points (40%) cannot be classified as "non-evaluable" in the records.

Language of written tests: THE SUBMISSION OF THE TRANSLATION OF PRESENTIAL ASSESSMENT TESTS WILL BE CARRIED OUT IF THE REQUIREMENTS ESTABLISHED IN ARTICLE 263 ARE MET AND THE REQUEST IS MADE IN WEEK 4 ELECTRONICALLY (E-FORM) (more information on the Faculty's website).

AI USE: In this course, the use of Artificial Intelligence (AI) technologies is not allowed at any stage. Any work that includes fragments generated with AI will be considered an act of academic dishonesty and may result in a partial or total penalty in the activity grade, or more severe sanctions in serious cases.

## Bibliography

### Prenatal module:

Main:

- LARSEN WD (2016) Embriología humana. 5<sup>a</sup> edición. Elsevier Ed. Format e-book a la UAB (Biblioteca de la UAB)
- SADLER TW (2019) Embriología médica de Langman. 14<sup>a</sup> edición. Wolters Kluwer/Lippincott Williams & Wilkins. Format e-book a la UAB (biblioteca UAB)

### Postnatal module:

Main:

- PAPALIA DE, OLDS SW.; DUSKIN R (2009). Human development. 13<sup>th</sup> edition. McGraw-Hill
- KLEIGMAN RM; STANTON B; St GEME J; SCHOR NF. (2015). Nelson textbook of pediatrics. 20<sup>th</sup> edition.

Additional:

- BUSTOS SANCHEZ I. (2014). Intervención logopédica en trastornos de la voz. Ed. Paidotribo
- COLL FLORTIT M; AGUADO G., FERNANDEZ ZUÑIGA A.; GAMBRA S, PERELLÓ E, VILA-ROVIRA JM (2013). Trastornos del habla y de la voz. Ed: UOC

## Software

It is not needed.

## Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(SEM) Seminars	111	Catalan	first semester	afternoon
(SEM) Seminars	112	Catalan	first semester	afternoon

(SEM) Seminars	113	Catalan	first semester	afternoon
(TE) Theory	1	Catalan/Spanish	first semester	morning-mixed