Developmental Biology and Teratology

Code: 102868
ECTS Credits: 3

2024/2025

Degree	Type	Year
2502442 Medicine	OT	2

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no established prerequisites. It is advisable for the student to have acquired basic self-learning and teamwork skills, as well as knowledge of biology at the pre-university level. The content of this subject is complemented by the knowledge acquired in the subjects Cell Biology, Human Genetics and the 4 subjects dedicated to Human Anatomy that are imparted in the first and second year of the Degree in Medicine.

Objectives and Contextualisation

Contextualization:

Developmental Biology and Teratogeny is an optional subject of 3 ECTS credits, which is included in the mentions: maternal-child health, medical clinic and clinical surgery.

General objectives:

To deepen in the knowledge of the reproductive mechanisms and human pre and postnatal development.

To study the main morphogenetic processes and their chronology. Understand their relationship with possible alterations.

To learn the main experimental techniques in embryology and teratology and its usefulness in basic and applied research.

To know the main control genes and cellular pathways involved in embryonic development.

Specific objectives:

To study the general aspects of developmental biology and teratogenesis.

To study the normal and anomalous development of organs and apparatus.

To introduce the student in the experimental techniques in embryology and teratology.

To deepen in the knowledge of the embryonic and fetal periods, both in the unique and multiple pregnancies.

To deepen in the knowledge of the anomalous development of the apparatus and systems.

To deepen in the genetic and cellular mechanisms for the normal development and their relation to congenital disorders.

Competences

- Be able to work in an international context.
- Communicate clearly, orally and in writing, with other professionals and the media.
- Demonstrate a sufficient command of English, both oral and written, for effective scientific and professional communication.
- Demonstrate an understanding of the fundamentals of action, indications, efficacy and benefit-risk ratio of therapeutic interventions based on the available scientific evidence.
- Demonstrate understanding of the organisation and functions of the genome, the mechanisms of transmission and expression of genetic information and the molecular and cellular bases of genetic analysis.
- Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
- Establish a diagnostic approach and a well thought-out strategy for action, taking account of the results of the anamnesis and the physical examination, and the results of the appropriate complementary tests carried out subsequently.
- Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
- Indicate the basic diagnosis techniques and procedures and analyse and interpret the results so as to better pinpoint the nature of the problems.
- Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
- Recognize one's role in multi-professional teams, assuming leadership where appropriate, both for healthcare provision and for promoting health.

Learning Outcomes

1. Assess the efficiency of the main therapeutic interventions.
2. Assess the need, indications, contraindications, chronology, risk, benefits and costs of each examination.
3. Assess the relationship between efficacy and risk in the main therapeutic interventions.
4. Be able to work in an international context.
5. Communicate clearly, orally and in writing, with other professionals and the media.
6. Compare one's own opinions with those of colleagues and other healthcare professionals as a basis for teamwork.
7. Critically assess the results of complementary examinations, taking their limitations into account.
8. Demonstrate a sufficient command of English, both oral and written, for effective scientific and professional communication.
9. Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
10. Describe the diagnosis, prognosis, prevention and treatment for the most common genetic pathologies in the human population.

11. Establish a method for complementary examinations, in accordance with the standard process and the diagnostic expectations.
12. Establish a therapeutic action plan considering the needs of patients and their family and social environment, and involving all members of the healthcare team.
13. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
14. Identify the genetic bases for the main diseases with a genetic basis or component.
15. Indicate and interpret the basic techniques and procedures for laboratory diagnosis, diagnostic imaging and others.
16. Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
17. Obtain, in an appropriate way, clinical samples needed for laboratory tests.
18. Order signs and symptoms to perform a differential syndromic diagnosis.
19. Relate genetic dysfunction to the pathological phenotype.

Content

1. GENERAL ASPECTS OF DEVELOPMENTAL BIOLOGY
    1. Introduction: concept, scope and historical aspects of developmental biology.
    2. Evolution and development
    3. Experimental embryology and animal models to study embryology.
2. ASPECTS OF NORMAL DEVELOPMENT
    1. Genes controlling the embryonic development.
    2. Genetic control of cleavage and pattern formation.
    3. Limb Development: mechanisms, evolution and congenital defects.
    4. Placenta and extraembryonic membranes.
    5. Multiple gestations.
    6. Highlights of the normal human development process.
3. ASPECTS OF ANOMALOUS DEVELOPMENT
    1. General aspects of teratology.
    2. Classification of physical congenital defects.
    3. Mechanisms of development in regeneration, repair and cancer.
    4. Anomalous development of the apparatus and systems of the human body.
    5. Chromosomal syndromes.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
CLASSROOM PRACTICES (CLASP)	8	0.32	5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 4, 7, 1, 2, 3
LABORATORY PRACTICES (LABP)	4	0.16	14, 19, 3
THEORY (T)	14	0.56	10, 14, 19
Type: Supervised			
TUTORIALS	7	0.28	5, 13, 18, 19, 4, 7
Type: Autonomous			

ELABORATION OF WORKS / PERSONAL STUDY / READING OF ARTICLES / REPORTS OF INTEREST	38	1.52	5, 8, 9, 12, 11, 13, 14, 15, 16, 17, 18, 19, 4, 7, 1, 2, 3

In accordance with the objectives of the subject, the teaching methodology of the course is based on the following activities:

AUTONOMOUS ACTIVITIES:

Comprehensive reading of texts and articles. Personal study. Realization of schemes and abstracts. Conceptual assimilation of the contents of the course.

GUIDED ACTIVITIES:

Theoretical classes: A systematized exhibition of the contents of the subject, giving relevance to the most important concepts. Students acquire the basic knowledge of the subject attending the lectures and complementing them with the personal study of the topics explained. 14 hours of theoretical classes are programmed.

Classroom practices: Sessions with a smaller number of students for the discussion and resolution of practical exercises. The knowledge acquired in the theory classes, the Tutorials and in the personal study are applied to the resolution of clinical cases that arise in the seminars. 8 hours of practical classes are programmed.

Laboratory practices: Students will familiarize themselves in small groups with the basic techniques of experimental embryology and the observation of normal and malformed embryos. 4 hours of laboratory sessions are programmed.

SUPERVISED ACTIVITIES:

Tutorials: The tutorials will be done in a personalized way in the teacher's office (schedule to be agreed). The aim of the tutorials is to clarify concepts, to establish the acquired knowledge and to facilitate the study by the students. They can also be used to resolve doubts that students have when are preparing the contents of classroom practices.

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

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
MULTIPLE CHOICE EXAM	50	2	0.08	10, 14, 1
PROBLEM BASED LEARNING	20	1	0.04	5, 6, 8, 9, 10, 12, 11, 13, 14, 15, 16, 17, 18, 19, 4, 7, 1, 2, 3
RESTRICTED RESPONSE QUESTIONS	30	1	0.04	10, 14, 19

The competences of this subject will be evaluated as follows:

Objective tests (70% of the final grade) of the knowledge acquired in the theoretical classes through multiple choice tests, evaluation of the work done in the practices regarding clinical cases based on problems (15% of the final grade), and evaluation of the knowledge acquired during the practical sessions (15% of the final grade).

1. CONTINUOUS EVALUATION:

The final qualification of each partial will be obtained according to the following scheme:

A. First part (35% of the total of the subject)

Objective test of the knowledge acquired in the theoretical classes corresponding to the first half of the subject.

B. Second part (35% of the total of the subject)

Objective test on the knowledge acquired in the theoretical classes corresponding to the second half of the subject.

C. Problem-based learning (15% of the grade for the subject)

This part will evaluate the work done and the knowledge acquired in the part of "Abnormal development of different devices and body systems" through the continuous evaluation of classroom practices and the presentation of work related to different clinical cases (Classroom practices 1-4). Having taken this part of the evaluation implies the elimination of teaching material.

D. Acquisition of practical and experimental knowledge (15% of the grade for the subject)

This part will evaluate the work done and the knowledge acquired in the laboratory practical sessions by filling in a questionaire integrated in a lab notebook that each student will ellaborate through the completion of the laboratory practices. Having taken this part of the evaluation implies the elimination of teaching material.

The final grade of the subject will be obtained by applying the formula:

(Grade of the first part x 0.35) + (Grade of the second part x 0.35) + (Grade of problem-based learning x 0.15) + (Grade of Acquisition of practical and experimental knowledge x 0.15)

To pass the course, the average of scores from the two partial exams must be equal to or greater than 5.0.

It is necessary to obtain a minimum mark of 4.0 in each of the partial evaluations, otherwise the average score cannot be calculated.

2. RECOVERY EXAM:

This exam is intended for students who are in any of the following situations after the endof continuous evaluation:

- Students who want to improve one or two partial scores.
- Students who have obtained a score lower than 4.0 in any of the two partial exams.
- Students who have obtained a qualification equal to or greater than 4.0 to both mid-term exams but do not have achieved the sufficiency.

The recovery exam will consist of an "objective exam" corresponding to each part. The student may perform one or both tests according to their situation. Each partial exam will have its own mark and the same criteria as in the continuous evaluation will be applied.

Scores corresponidng to the Problem-based learning and Acquisition of practical and experimental knowledge will be obtained during the process of continuous evaluation.

In any case, the scores used to calculate the final qualification will be always the highest of the obtained

The final qualification from the recovery exam is calculated in the same way and with the same criteria described for the continuous evaluation.

Additional considerations: Students that have not attended to any exam along the course are considered non evaluable.

This subjectdoes NOT provide the single assessment system.

Bibliography

CARLSON BM (2014). Human embryology and Develpmental biology. 5ª edición. Ed. Elsevier.

MOORE KL (2013). Clinical embryology. 9ª edición. Ed. Elsevier Saunders.

NUSSBAUM RL. (2016). Thompson & Thompson. Genetics in medicine. 8ª edición. Ed. Elsevier.

ROHEN J, LÜTJEN-DRECOLL (2008). Functional embryology. 3ª edición. Ed. Panamericana.

SADLER TW (2016). Langman. Medical Embryology. 13ª edición. Ed. Wolters Kluwer

TURNPENNY PD, ELLAR S (2018). Emery's. Elements of medical genetics. 15ª edición. Ed. Elsevier

Software

No specific software is required for this subject

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	101	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	101	Catalan/Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	102	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	101	Catalan/Spanish	second semester	morning-mixed