

Developmental Biology and Teratology

Code: 102868
ECTS Credits: 3

Degree	Type	Year	Semester
2502442 Medicine	OT	2	2
2502442 Medicine	OT	3	0
2502442 Medicine	OT	4	0
2502442 Medicine	OT	5	0
2502442 Medicine	OT	6	0

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Pere Jordi Fàbregas Batlle
Michael John Edel
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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 Teratology 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 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.

Competences

Medicine

- 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 basic statistical methodologies used in biomedical and clinical studies and use the analytic tools of modern computational technology.
- Demonstrate understanding of the causal agents and the risk factors that determine states of health and the progression of illnesses.
- 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 understanding of the structure and function of the human organism in illness, at different stages in life and in both sexes.
- 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 normal and pathological pregnancy and childbirth. Postpartum.
11. Describe the diagnosis, prognosis, prevention and treatment for the most common genetic pathologies in the human population.
12. Describe the physical, chemical, environmental, psychological, social and occupational and carcinogenic factors, and the factors associated with food habits and drug use, that determine the development of the disease.
13. Design methodologies for the experimental study of genetic diseases.
14. Differentiate between situations that require hospitalisation and those that require intensive care.
15. Establish a method for complementary examinations, in accordance with the standard process and the diagnostic expectations.
16. Establish a therapeutic action plan considering the needs of patients and their family and social environment, and involving all members of the healthcare team.
17. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
18. Identify the affection of medical and surgical diseases of the genital system.
19. Identify the genetic bases for the main diseases with a genetic basis or component.
20. Indicate and interpret the basic techniques and procedures for laboratory diagnosis, diagnostic imaging and others.
21. Indicate suitable therapeutic interventions for the main maternal and infant health problems.
22. Know, critically assess and use clinical and biomedical information sources and technologies.
23. Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
24. Obtain, in an appropriate way, clinical samples needed for laboratory tests.
25. Obtain, organise, interpret and communicate clinical, scientific and healthcare information.
26. Order signs and symptoms to perform a differential syndromic diagnosis.
27. Relate genetic dysfunction to the pathological phenotype.
28. Understand and interpret statistical data in medical literature.

Content

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

Methodology

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.

Note: Due to the situation caused by Covid-19, the methodology of the subject may suffer variations according to sanitary situation.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
CLASSROOM PRACTICES (CLASP)	8	0.32	5, 6, 22, 8, 9, 11, 12, 10, 13, 28, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 4, 7, 1, 2, 3
LABORATORY PRACTICES (LABP)	4	0.16	19, 27, 3
THEORY (T)	14	0.56	11, 19, 27
Type: Supervised			
TUTORIALS	7	0.28	5, 13, 17, 26, 27, 4, 7
Type: Autonomous			
ELABORATION OF WORKS / PERSONAL STUDY / READING OF ARTICLES / REPORTS OF INTEREST	38	1.52	5, 22, 8, 9, 14, 13, 28, 16, 15, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 4, 7, 1, 2, 3

Assessment

The competences of this subject will be evaluated as follows:

Objective tests (80% of the final grade) of the knowledge acquired in the theoretical classes through multiple choice tests, and evaluation of the work done in the practices regarding clinical cases based on problems (20% of the final grade).

1. CONTINUOUS EVALUATION:

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

A. First part (40% of the total of the subject)

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

B. Second part (40% of the total of the subject)

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

C. Problem-based learning (20% 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.

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

$(\text{Grade of the first part} \times 0.4) + (\text{Grade of the second part} \times 0.4) + (\text{Grade of problem-based learning} \times 0.2)$

To achieve the sufficiency, 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 end of 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.

The score corresponding to the first partial will be obtained entirely from the objective test.

The score corresponding to the second partial will be obtained from the weighted sum of the score obtained in the "objective test" and the score from continuous assessment obtained in first place.

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.

Note: Due to the situation caused by Covid-19 or other causes, the evaluation may suffer changes according to sanitary situation.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
MULTIPLE CHOICE EXAM	50	2	0.08	11, 12, 10, 19, 1
PROBLEM BASED LEARNING	20	1	0.04	5, 6, 22, 8, 9, 11, 12, 10, 14, 13, 28, 16, 15, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 4, 7, 1, 2, 3
RESTRICTED RESPONSE QUESTIONS	30	1	0.04	11, 12, 10, 19, 27

Bibliography

CARLSON BM (2014). Human embryology and Developmental 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