

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

Rosa Miró Ametller
Santiago Rojas Codina
Xavier Domingo Miró

Prerequisites

Although there are no prerequisites, the student should have achieved the basic skills of self-learning and group work, as well as knowledge of biology at the high school level. Students are advised to have passed the subjects of Human Anatomy and Cell Biology. This matter is also complemented by the knowledge of the subjects of Human Anatomy II and Human Genetics.

Objectives and Contextualisation

Contextualization:

The course developmental biology and teratology is an optional subject of 3 ECTS credits and 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 of the human pre and postnatal development.

To study the main morphogenetic processes and their chronology. Understand the meaning of 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 of 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.

Train 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 mechanisms of alterations to the structure and function of the systems of the organism in illness.
- 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. Explain the mechanisms by which illness affects the different systems of the human body at different stages in life and in both sexes.
18. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
19. Identify the affection of medical and surgical diseases of the genital system.
20. Identify the genetic bases for the main diseases with a genetic basis or component.
21. Indicate and interpret the basic techniques and procedures for laboratory diagnosis, diagnostic imaging and others.
22. Indicate suitable therapeutic interventions for the main maternal and infant health problems.
23. Know, critically assess and use clinical and biomedical information sources and technologies.
24. Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
25. Obtain, in an appropriate way, clinical samples needed for laboratory tests.
26. Obtain, organise, interpret and communicate clinical, scientific and healthcare information.
27. Order signs and symptoms to perform a differential syndromic diagnosis.
28. Relate genetic dysfunction to the pathological phenotype.
29. 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. Evolution and development.
 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. Cancer and development: two sides of the same coin.
 5. Placenta and fetal membranes.
 6. 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.

Methodology

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 Studio. Realization of schemes and abstracts. Conceptual assimilation of the contents of the course.

GUIDED ACTIVITIES:

Theoretical classes: A systematized exhibition of the syllabus 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. 15 hours of theoretical classes are programmed.

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

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 per practice group 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 for the seminars.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
CLASSROOM PRACTICES (CLASP)	8	0.32	5, 6, 23, 8, 9, 11, 12, 10, 13, 29, 16, 18, 17, 19, 20, 21, 22, 24, 25, 26, 27, 28, 4, 7, 1, 2, 3
LABORATORY PRACTICES (LABP)	4	0.16	20, 28, 3
THEORY (T)	14	0.56	11, 20, 28
Type: Supervised			
TUTORIALS	7	0.28	5, 13, 18, 27, 28, 4, 7
Type: Autonomous			
ELABORATION OF WORKS / PERSONAL STUDY / READING OF ARTICLES / REPORTS OF INTEREST	38	1.52	5, 23, 8, 9, 14, 13, 29, 16, 15, 18, 17, 19, 20, 21, 22, 24, 25, 26, 27, 28, 4, 7, 1, 2, 3

Assessment

Evaluation

The competences of this subject will be evaluated by:

1. Objective tests (80% of the final mark) of the knowledge acquired in the lectures, classroom practices and laboratory practices. These objective tests will be composed of objective tests of multiple choice (62.5% of the total of the mark objective tests) and of objective proofs of restricted response questions (37.5% of the total of the mark of the objective evidence).
2. Problem-based learning (20% of the final grade) through the evaluation of the attitude demonstrated in the classroom practice and work relating to clinical cases.

1. CONTINUOUS ASSESSMENT:

The course is divided into three parts. The evaluation will be divided into two mid-term evaluations: The first mid-term exam will include the first and the second part and the second mid-term exam will include the third.

The final grade of each part will be done following the following diagram:

1. First mid-term exam (corresponding to 50% of the total subject)

- *Objective test* of the knowledge acquired in the theoretical classes and the laboratory practices corresponding to the first and second parts.

1. Second mid-term exam(corresponding to 50% of the total subject).
 1. *Objective Test* (60% of the second partial mark) on the knowledge acquired in the lectures and classroom practices corresponding to the third part
 2. *Problem-Based learning (40% of the second partial note)* to which the attitude and knowledge acquired in the "anomalous development of the different apparatus and body systems" will be evaluated, through continuous evaluation in classroom internships and the presentation of works relating to the different clinical cases.

The final grade of the course will be the average of the notes of both partials.

1. To pass the course it is necessary that the average of the notes of the two mid-term exams is equal to or greater than 5.0.
2. To be able to do average, it is necessary to obtain a minimum mark of 4.0 in each of the mid-term evaluations.
3. Students who approve the subject with the average of the mid-term exams will not be obliged to take the final (recovery) exam.

2. RECOVERY EXAM:

Once the two partials are assessed, an exam will be programmed according to the teaching calendar of the faculty, intended for students who are in any of the following situations:

- Students who want to upload one or two mid-term grades.
- Students who have obtained a rating lower than 4.0 in any of the two mid-term exams.
- Students who have obtained a qualification equal to or greater than 4.0 to both mid-term exams but do not have passed the subject.
- The final exam will consist of an "objective test" corresponding to each part. The student may perform one or both tests according to their particular situation.
- The mark corresponding to the first part will be the grade obtained in the objective test.
- The mark corresponding to the second mid-term exam will be obtained from the weighted sum of the mark obtained in the "objective test" and the continuous assessment mark obtained in the first instance.

- In any case, the note used to calculate the "final grade" will be the highest of the two obtained (the mid-term exam carried out along the course and that of the same part evaluated within the recovery exam)
- The final grade obtained after completing the recovery exam is calculated in the same way and with the same criteria as those described prior to the "final grade of the course".

NOTE: Students are considered not to be able to assess when they that have not attended to any exam along the course.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
MULTIPLE CHOICE EXAM	50	2	0.08	11, 12, 10, 17, 20, 1
PROBLEM BASED LEARNING	20	1	0.04	5, 6, 23, 8, 9, 11, 12, 10, 14, 13, 29, 16, 15, 18, 17, 19, 20, 21, 22, 24, 25, 26, 27, 28, 4, 7, 1, 2, 3
RESTRICTED RESPONSE QUESTIONS	30	1	0.04	11, 12, 10, 20, 28

Bibliography

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MOORE KL (2013). Embriología clínica. 9ª edición. Ed. Elsevier Saunders.

NUSSBAUM RL. (2016). Thompson & Thompson. Genética en medicina. 8ª edición. Ed. Elsevier.

ROHEN J, LÜTJEN-DRECOLL (2008). Embriología funcional. 3ª edición. Ed. Panamericana.

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