

**COURSE DATA****Data Subject**

<b>Code</b>	34442
<b>Name</b>	Embryology
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	4.5
<b>Academic year</b>	2022 - 2023

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1204 - Degree in Medicine	Faculty of Medicine and Odontology	1	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1204 - Degree in Medicine	2 - Human anatomy II	Basic Training

**Coordination**

<b>Name</b>	<b>Department</b>
SAN MIGUEL DIEZ, TERESA CONSUELO	285 - Pathology
ZABALETA MERI, MARIA MERCEDES	17 - Human Anatomy and Embryology

**SUMMARY**

This subject has as the main goal the study of the modifications that cells, tissues and the human being organs experience during the normal prenatal development.

It deals with the study of defects in development due to genetic and environmental causes that altering the normal development are responsible of those known as congenital defects.

It provides basic content for clinical subjects such as obstetrics and pediatrics.

The knowledge of the development disorders is of special interest in relation with the infant mortality that can condition.



## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

## OUTCOMES

### 1204 - Degree in Medicine

- Understand and recognise the structure and normal function of the human body, at the following levels: molecular, tissue, organic, and of systems, in each phase of human life and in both sexes.
- Understand and recognise the effects of growth, development and aging which affect individuals and their social environment.
- Know how to use the sources of clinical and biomedical information available, and value them critically in order to obtain, organise, interpret and communicate scientific and sanitary information.
- Know how to use IT in clinical, therapeutic and preventive activities, and those of research.
- In the professional practise, take a point of view which is critical, creative, constructive and research-oriented.
- Be able to formulate hypothesis, gather information and evaluate it critically in order to solve problems by following the scientific method.
- 
- Proper organisation and planning of the workload and timing in professional activities.
- Team-working skills and engaging with other people in the same line of work or different.
- Criticism and self-criticism skills.
- Capacity for communicating with professional circles from other domains.
- Acknowledge diversity and multiculturality.
- Consideration of ethics as a fundamental value in the professional practise.
- Working capacity to function in an international context.
- Knows the mechanisms of information, expression and genetic regulation. Inheritance patterns.
- Knows the phases of embryonic development and organogenesis.
- Knows the processes of growth, maturation and aging of the different organs and systems. Homeostasis. Adaptation to the environment.
- Recognises the morphology and structure of tissue, organs and systems through macroscopic and microscopic methods, and image techniques.



## LEARNING OUTCOMES

Once the complete subject is coursed the student must be able to know and to understand:

1. The mechanisms of oogenesis and spermatogenesis in the formation of the zygote.
2. The bases of the principles of inheritance.
3. The importance of the different genetic anomalies in the first stages of the embryonic development.
4. The importance of the first weeks of the development in relation with possible fetal anomalies of genetic, toxic and infectious origin.
5. The tissue origin of the different apparatus and systems as well as the different anatomic structures that compose them.
6. The reason of the own malformations of the different apparatus and systems to understand their pathophysiology and clinical manifestations.

## DESCRIPTION OF CONTENTS

### 1. THEORY

1. Gametogenesis: oogenesis.
2. Gametogenesis: spermatogenesis.
3. Fecundation.
4. Transmission of the genetic information.
5. Heritage: patterns of the autosomal transmission.
6. Heritage: patterns of the transmission linked to the X chromosome.
7. Numerical chromosomal anomalies.
8. Structural chromosomal anomalies.
9. First weeks of the embryonic development (I).
10. First weeks of the embryonic development (II)
11. Placenta and fetal membranes.
12. Development of the central nervous system: encephalic gallbladder and derivatives.
13. Development of the peripheral nervous system. Neural crest derivatives.
14. Heart development.
15. Heart septum.
16. Arterial system development.
17. Development of the venous.
18. Development of the pharyngeal arches, pouches and clefts.
19. Respiratory system development.
20. Development of the digestive system and annexed glands.
21. Urinary system development. Nephritic systems. Liver and urinary tracts.
22. Development of the genital system and caudal pole of the embryo in both genders.

**2. PRACTICES**

## LABORATORY PRACTICES

1. Gametogenesis.
2. Chromosomal formulation.
3. Gamete segregation.

## COMPUTER PRACTICES

1. First weeks of the embryonic development I and II.
2. Malformations of the central and peripheral nervous systems.
3. Fetal and definitive circulation. Heart malformations.
4. Development of the face. Malformations.
5. Development of the body cavities, the mesenteries and the diaphragm. Malformations.

## SEMINAR PRACTICES

1. Development of the skeletal system, the muscular system and the extremities. Malformations.
2. Development of the eye and the ear. Malformations.

**WORKLOAD**

<b>ACTIVITY</b>	<b>Hours</b>	<b>% To be attended</b>
Theory classes	25,00	100
Computer classroom practice	10,00	100
Laboratory practices	6,00	100
Seminars	4,00	100
Development of individual work	10,00	0
Study and independent work	22,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	10,50	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	10,00	0
<b>TOTAL</b>	<b>112,50</b>	



## TEACHING METHODOLOGY

### - Theoretical Lessons (22 Thematic Units):

Expositive lessons taught in the classroom that triggers the student's active participation.

### - Laboratory Practical Lessons (3 Thematic Units):

With problem solving activities and exercises about the principles of the heritage and their main anomalies.

### - Computer Practical Lessons (5 Thematic Units):

With the computer programs, videos and diagnostic techniques that reinforce the learning and the knowledge of the subject.

### - Seminar Practical Lessons (2 Thematic Units):

Using auxiliary mediums, determined topics are developed in reduced groups.

## EVALUATION

Evaluation of this subject depends on both areas of knowledge, 1/3 to Biology and 2/3 to Human Anatomy and Embryology.

### **Anatomy and Embryology assessment: 65% of the final qualification (6.5 points).**

- **Theoretical evaluation: 40% of the final qualification (4 points).**

This will be done through a **written test** that will focus on the contents of the theoretical program and will aim to evaluate the acquisition of the acquired knowledge. The content of the test will be the same for all groups of the subject.

It will consist of **50 multiple choice questions** (5 possible answers, 1 true / 4 false). Qualification criteria: 0.08 points / correct answer. The formula for removal of the component will be applied by chance, that is, 0.02 will be subtracted for each unanswered question. Unanswered questions do not subtract points.

- **Practical evaluation: 25% of the final qualification (2.5 points).**

This will be done through a **written test** that will focus on the contents of the practical program and will aim to evaluate the acquisition of the acquired knowledge. The content of the test will be the same for all groups of the subject.

It will consist of **20 multiple choice questions** (5 possible answers, 1 true / 4 false) about the contents of the practical program explained during the computer classes and seminars. Qualification criteria: 0.125 points / correct answer. The formula for removal of the component will be applied by chance, that is, 0.03125 will be subtracted for each unanswered question. Unanswered questions do not subtract points.



**The overall assessment of anatomy must reach a minimum of 3.25 points** between the theoretical and the practical part, being able to average whenever a minimum of 40% of the score is reached in each of them.

**Biology assessment: 35% of the final qualification (3.5 points).**

- **Theoretical evaluation: 20% of the final qualification (2 points).**

It will be done through a **written exam** that will focus on the contents of the theoretical program and will aim to evaluate the acquisition of acquired knowledge. The content of the test will be the same for all the groups. It will consist of **4 short questions with limited scope or varied format**.

- **Practical evaluation: 15% of the final qualification (1.5 points).**

It will be done through a **written exam** and will consist of **3 practical questions**.

**The overall assessment of biology should reach a minimum of 1.5 points between the theoretical and the practical part, to add to the grade obtained in the part of ANATOMY.**

**The qualifications of each of the parties (anatomy and biology) will not be saved for the following calls.**

**Attendance of practices is mandatory.** Unjustified non-attendance to more than 20% of the sessions will make it impossible to pass the course.

Students are reminded of the importance of carrying out evaluation surveys on all the teaching staff of the degree subjects.

## REFERENCES

### Basic

- ARTEAGA MARTINEZ, S.M; GARCIA PELAEZ, M.I. (2017). Embriología humana y biología del desarrollo. 2ª edición. Ed. Panamericana.
- LANGMAN, T.W.SADLER. (2019). Embriología médica. 14ª edición. Ed. Wolters Klumer/Lippincot Williams & Wilkins.
- MOORE, K.L; PERSAUD, TVN; TORCHIA, M.G. (2020). Embriología clínica. 11ª edición. Ed. Elsevier.
- TOMPSON & THOMPSON (2016). Genética en Medicina. 8ª edición. Ed. Elsevier Masson.
- JORDE L.B., CAREY J.C & BAMSHAD M.J. (2020). Genética Médica. 6ª edición. Ed. Mosby.



- Recursos e-Salut: ClinicalKey Student. Elsevier (Scopus, ScienceDirect).  
[uv-es.libguides.com/RecursosSalut/BibliotecaSalut](http://uv-es.libguides.com/RecursosSalut/BibliotecaSalut)

### Additional

- CARLSON, B.M. (2019). Embriología humana y biología del desarrollo. 6ª edición. Ed. Elsevier.
- FLORES, WLADIMIR. (2015). Embriología Humana. Ed. Panamericana.
- LARSEN, W.J. (2016). Embriología humana. 5ª edición. Ed. Elsevier.
- MOORE, K.L.; PERSAUD, TVN; TORCHIA, M.G. (2016). Antes de nacer. Fundamentos de embriología y anomalías congénitas. 9ª edición. Ed. Panamericana.
- WEBSTER, S; DE WREEDE, R. (2013). Embriología. Lo esencial de un vistazo. Ed. Panamericana.
- CALVO, A. (2015). Biología Celular Biomédica. 1ª edición. Ed. Elsevier.
- MCGOWAN-JORDAN, J. HASTINGS, J. MOORE, S. (2020). ISCN 2020. An International System for Human Cytogenomic Nomenclature (2020). 1ª edición. Ed. Karger.
- TURNPENNY, PD; ELLARD, S; CLEAVER, R. Emery. (2022). Elementos de genética médica y genómica. 16.ª Edición. Ed. Elsevier.