

COURSE DAT	Α					
Data Subject						
Code	33071					
Name	Development biology					
Cycle	Grade					
ECTS Credits	4.5					
Academic year	2023 - 2024					
Study (s)						
Degree		Center		Acad. Period year		
1100 - Degree in Biology		Faculty of Biolo	ogical Sciences	2 Second term		
Subject-matter						
Degree	egree		r	Character		
1100 - Degree in Biology		8 - Development biology		Obligatory		
Coordination						
Name		Department				
TARIN FOLGADO, JUAN JOSE		357 - Cellular Biology, Functional Biology and Physical Anthropol.				

SUMMARY

The compulsory course entitled "Developmental Biology" is taught in the second semester of the second year of the Degree in Biology. This course aims that undergraduate students reach a comparative vision of gametogenesis, fertilization and embryonic and postnatal development of different groups of metazoans. Various animal models of morphogenesis, specification of embryonic axes, organogenesis, migration of primordial germ cells, primary and secondary sex determination, limb development, and tissue regeneration are analyzed. Likewise, special mention is made of the role that programmed cell death plays in animal development.

Thus, this course collects, rethinks, expands and questions previous knowledge acquired by students about the genesis of new organisms.



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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

1100 - Degree in Biology

- Capacidad de obtención, análisis y síntesis de la información.
- Utilización del vocabulario de Biología del Desarrollo.
- Capacidad de resolución de problemas y toma de decisiones.
- Habilidad para el trabajo en equipo.
- Análisis crítico de textos científicos.
- Aprendizaje autónomo y creatividad.
- Valoración de las implicaciones éticas de los conocimientos sobre Biología del Desarrollo.
- Conocer las estrategias metodológicas más relevantes, para el estudio de la Biología del desarrollo.
- Conocer y comprender los procesos, interacciones y cambios temporales/espaciales que rigen el desarrollo de los organismos, en los distintos niveles de organización.
- Conocer y comprender los procesos celulares y moleculares de renovación y reparación tisular.
- Conocer los procesos del desarrollo embrionario de los principales organismos modelo en Biología del Desarrollo.

LEARNING OUTCOMES

- Identify the stages of development of embryos of metazoan model species.

- Understand the cellular and molecular mechanisms of gametogenesis, fertilization and embryonic development of metazoans from a comparative point of view.

- Relate organs and tissues with the three primary cell layers in embryos of metazoan model species.

- Understand the cellular and molecular bases of the establishment of patterns of segmentation, gastrulation, cell fate, morphogenesis and tissue renewal and repair.

- Know how to interpret developmental biology laboratory experiments.



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DESCRIPTION OF CONTENTS

1. THEORY

- Definition, objectives, origins and evolution of the basic concepts of Developmental Biology.
- Comparative overview of gametogenesis, fertilization, embryonic segmentation and gastrulation in metazoans.
- Cell differentiation and morphogenesis.
- Types of cell interactions and inductions.
- Specification of the antero-posterior, dorso-ventral, and left-right embryonic axes.
- Anatomical, histological and cellular differentiation of ectoderm, endoderm and paraxial, intermediate and lateral mesoderm.
- Determination and migration of primordial germ cells.
- Sex determination.
- Formation of the pattern of extremities.
- Types of tissue regeneration.
- Role of programmed cell death in development.

2. LABORATORY EXERCISES

- Male and female gametogenesis in insects, fish and mammals.
- Gastrulation and larval histogenesis in amphibians.
- Fertilization and embryo development in sea urchins.
- Histogenesis in avian embryos during organogenesis.
- Histogenesis of cerebellum and spinal cord in mammals.

WORKLOAD

ACTIVITY		Hours	% To be attended
Theory classes		30,00	100
Laboratory practices		10,00	100
Tutorials		5,00	100
Development of group work		3,00	0
Development of individual work		5,00	0
Study and independent work		59,50	0
	TOTAL	112,50	



TEACHING METHODOLOGY

The acquisition of knowledge and skills by the students is based on five types of activities:

Theoretical classes: The teacher will present the essential contents of each topic, using the appropriate audiovisual resources, guiding students in the use of bibliographic material, as well as the discussion of problems raised in the classroom.

Practical classes: During the laboratory sessions, the teacher will present the objective and the guidelines of each laboratory exercise. Thereafter, the student will observe, analyze and interpret the respective histological slides.

Group tutorials: Dedicated to the expansion and review of different parts of the theory syllabus to delve into the contents that, due to time constraints, cannot be covered in theory classes.

Personal tutorials: Students' individual doubts will be clarified using the time assigned by the University regulations. Optionally, at the discretion of each teacher, tutorials may be interactive and/or on-line.

Interdisciplinary works: These will be performed by 2-3 students on topics related with any of the courses taught in the second year of undergraduate studies. The number of topics will be proportional to the number of hours taught in each course. Each literature review will be presented orally in classroom sessions. The best reviews will be presented in a meeting organized by the Faculty of Biology. Alternatively to this activity, other interdisciplinary activities, framed within a project of educational innovation supported by the CAT may be performed.

ADDENDUM

In the event that the health situation, which has been dragging on since the beginning of 2020, alters the presence in the classrooms during the course, forcing the theoretical and / or practical teaching to be adapted to the semi-face-to-face modality or even , non-face-to-face, the following teaching measures will be adopted:

(1) Theoretical classes will be developed with the support of digital cameras in the classrooms or teachers' offices to broadcast the classes telematically using the computer resources offered by the Virtual Classroom.

(2) Group and practical tutoring sessions will be based on the study and analysis of images and videos that will be provided to students, as well as links to WEB pages from universities or institutions of recognized academic prestige.

(3) The personal tutoring sessions will be on-line using the computer resources offered by the Virtual Classroom.

EVALUATION



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REFERENCES

Basic

- Barresi, M.J. and Gilbert, S.F. (2020). Developmental Biology. 12th ed. Sinauer Associated, Inc.
- Tarín, J.J., Cano, A. (2000). Fertilization in Protozoa and Metazoan Animals. Cellular and Molecular Aspects. Springer.

Additional

- Aeckerle N, Drummer C, Debowski K, Viebahn C, Behr R. Primordial germ cell development in the marmoset monkey as revealed by pluripotency factor expression: suggestion of a novel model of embryonic germ cell translocation. Mol Hum Reprod. 2015 Jan;21(1):66-80. doi: 10.1093/molehr/gau088. Epub 2014 Sep 18. Erratum in: Mol Hum Reprod. 2015 Jun;21(6):552.
- Callebaut M. Origin, fate, and function of the components of the avian germ disc region and early blastoderm: role of ooplasmic determinants. Dev Dyn. 2005 Aug;233(4):1194-216.
- Kaneda T, Motoki JY. Gastrulation and pre-gastrulation morphogenesis, inductions, and gene expression: similarities and dissimilarities between urodelean and anuran embryos. Dev Biol. 2012 Sep 1;369(1):1-18. doi: 10.1016/j.ydbio.2012.05.019.

