

Degree programme	Type	Course
Genetics	OB	2

Contact lecturer

Name : Isaac Salazar Ciudad

Email : isaac.salazar@uab.cat

Prerequisites

Knowledge needed to correctly follow the course:

- To know and understand the basic fundamentals of the subjects of the first course: Genetics, Cell Biology and Histology.
- Know and understand the basic fundamentals of the subject Molecular biology of eukaryotes in the first semester of the second year.
- Oral and reading comprehension of English.

Group languages

You can consult this information at the [end](#) of the document.

Objectives

Developmental biology is the science that studies the causes and processes by which an egg cell gives rise over time to an adult organism development characterized by having different types of cells (cell differentiation) and a specific spatial distribution of these (pattern formation and morphogenesis).

The course begins with a phenomenological level description of the nature of the development process, what are the main questions the biology and genetics of development and the relationship between development and evolution.

The second part of the course explains in detail the current knowledge about the causes and mechanisms of pattern formation and morphogenesis in animals. We will especially insist on understanding the logic of these mechanisms. At this stage we will explain the best known examples for each model species regardless of their phylogenetic position. We will also insist on how to integrate all levels of organization, from gene interactions to mechanical interactions in tissues and large groups of cells.

The third part of the syllabus explores the diversity of animal development. The developmental processes studied separately in the second half of the course will be related between them by studying the entire development of specific species.

The fourth part explores how what the students have learned about how to shape morphology can help you understand how this morphology varies and may vary in evolution. We will introduce specific examples of the evolution of development and the basic principles of how development affects the direction of evolutionary change.

Learning outcomes

- CM24 (Evaluate the validity and significance of experimental results on molecular mechanisms and developmental processes.) Evaluate the validity and significance of experimental results on molecular mechanisms and developmental processes.
- KM20 (Describe the mechanisms of mutation, DNA repair, and the function of mobile elements in pathogenesis and evolution.) Describe the mechanisms of mutation, DNA repair, and the function of mobile elements in pathogenesis and evolution.
- SM23 (Relate the structure and dynamics of nucleic acids to the application of molecular techniques in the study of developmental biology.) Relate the structure and dynamics of nucleic acids to the application of molecular techniques in the study of developmental biology.

Contents

Topic 1: Introduction to the phenomena and fundamental questions of developmental biology and evolution.

Topic 2: basic cell behaviors involved in the development.

Topic 3: Levels of gene regulation.

Topic 4: Methods

Topic 5: Basic mechanisms of pattern formation: independent mechanisms and inductive mechanisms

Topic 6: Morphogenetic mechanisms.

Topic 7: Diversity of animal development.

Topic 9: Hirudinia.

Topic 9: \"Small phyla.\"

Topic 10: Arthropods, Drosophila.

Topic 11: Equinoïdeus and tunicates.

Topic 12: zebrafish.

Topic 13: Anura and salamander.

Topic 14: Chicken and mouse.

Topic 15: Development of organs I: Wing Drosophila and legs.

Topic 16: Development of organs II: nervous system.

Topic 17: Development of organs III: teeth.

Topic 18: Examples of developmental evolution.

Topic 19: Role of disparities in development and animal evolution. Examples desevolupamental origin of morphological variation.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
tutorials	38	1.52	CM24, KM20, SM23
exams	8	0.32	CM24, KM20, SM23
lectures	15	0.6	CM24, KM20, SM23
problem solving	30	1.2	CM24, KM20, SM23
problem solving	30	1.2	CM24, KM20, SM23
studying and bibliography reading	6	0.24	CM24, KM20, SM23

The teaching methodology includes three types of activities: lectures, problem solving and tutorials.

Lectures: they are used to provide students with the basic conceptual and the minimum information necessary so that you can then develop independent learning. Used computer resources (ppt presentations) will be available to students on moodle.

Seminars and problems: problems of seminars will be held in small groups (max. 30 students). The students should solve problems that previously delivered by the teacher, which will help to learn to reason and apply knowledge. Innovative teaching methodology: \"learning based on the ability to solve problems or cases independently or under supervision\"

Tutorials: There will be tutoring students on request. There will be also tutoring classroom with groups of 30 students if agreed with the students before exams. The aim of these sessions will be to answer questions, review basic concepts and guidance on information sources consulted.

The professor would allow 15 minutes of a lecture to fill the questionnaires about teaching evaluations.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
First partial exam	40%	7.5	0.3	CM24, KM20, SM23
Quiz 2	10%	4	0.16	CM24, KM20, SM23
Second partial exam	40%	7.5	0.3	CM24, KM20, SM23
Quiz 1	10%	4	0.16	CM24, KM20, SM23

-Quiz 1 for the first 25% of the topics on the course (10% of the assessment).

- First partial exam for the first 50% of the topics of the course (40% of the assessment).

-Quiz 2 for the first 25% of the second part of the course (10% of the assessment).

- Second partial exam for the second 50% of the topics of the course (40% of the assessment).

-Recover exam

To pass the course a 5 or more in the weighted mean of the exams is required. Those that do not pass can take a recovering examen. In that last case the grade of the course will be the grade of this last exam. To be able to attend this last examen a students needs to have take part in the two previous partial exams.

The exam consists of multiple conceptual questions and problems.

The quiz would consist in short questions. The quiz will be done in the lecture rooms.

No evaluable

A student would be considered \"No Evaluable\" if he/she does not take part in any of the partial exams.

Single test option. Students who wish to do so and notify the teacher before the first quiz may opt for a single test.

The single assessment will consist of:

Single common exam of the entire program which will be like the final exam. The single test includes the contents of the entire program. The grade obtained in this test is 100% of the final grade of the subject. The single assessment test will coincide with the same date fixed in the calendar for the last continuous assessment test and the same recovery system will be applied as for the continuous assessment.

The commission of any irregularity in an assessment act (academic fraud, plagiarism or improper use of AI, unless this use is expressly authorized in the teaching guide), which may lead to a significant variation in the grade, means that this act will be graded with a 0. In the event that the teaching guide provides that to pass the subject it is an essential requirement to have obtained a minimum grade in this assessment act or that several irregularities occur in the assessment acts of the same subject, the final grade for this subject is 0. Apart from this, a disciplinary process may be initiated against the student who incurs any of these irregularities.

Bibliography

Scott F. Gilbert & Barresi MJF. Developmental Biology, Ninth Edition. 2023. Sinauer Associates, Sunderland, MA.

Forgács and Newman. The Physics of the developing embryo. 2005. Cambridge University Press

Salazar-Ciudad, I., Newman, S.A. and Jernvall, J. (2003). Development.

Salazar-Ciudad, I. (2010). Development.

Software

None

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	62	Catalan	second semester	afternoon
(PAUL) Classroom practices	621	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	622	Catalan	second semester	morning-mixed