Teaching Guide				
Identifying Data				2016/17
Subject (*)	Bioloxía do desenvolvemento		Code	610G02010
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optativa	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía Celular e Molecular			
Coordinador	Yañez Sanchez, Julian	E-mail	julian.yanez@udc.es	
Lecturers	Folgueira Otero, Mónica Yañez Sanchez, Julian	E-mail	m.folgueira@udc.es julian.yanez@udc.es	
Web				
General description	Development is an outstanding process of selfconstruction (and also renovation) of all multicellular organisms from the unicellular condition. This course is an optional subject in the second semester of 4th year (8th semester) in which it integrates information and biological knowledge taken in previous years. This course cover the study of the cellular basis and molecular mechanisms involved in the process of ontogenetic development of multicellular organisms, especially in the processes of differentiation and morphogenesis, emphasizing primarily in the development of metazoans.			

Study programme competences	
Code	Study programme competences
A1	Recoñecer distintos niveis de organización nos sistemas vivos.
A4	Obter, manexar, conservar e observar especímenes.
A26	Deseñar experimentos, obter información e interpretar os resultados.
A29	Impartir coñecementos de Bioloxía.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
B4	Traballar de forma autónoma con iniciativa.
B8	Sintetizar a información.
B11	Debater en público.

Learning outcomes			
Learning outcomes	Study programme competences		
Understand the fundamentals, processes and trends of developmental of muticellular organisms.	A1 A4 A29	B4 B8 B11	
To study the cellular and molecular mechanisms underlying developmental processes, particularly those involved in the differentiation and morphogenesis	A1 A4 A29	B4 B8 B11	
To know and be familiar with the methodologies, experimental processes, instrumentation and technical terms, based on the scientific method to the study of Developmental Biology	A26 A30 A31		

Contents	
Topic	Sub-topic

I. Concepts and Processes of Development from a historical perspective	Multicellularity, Morphogenesis and differentiation. Epigenesis vs. Preformation. Mosaic and regulative development . Induction. Ontogeny and Phylogeny.
II. Gametogenesis and the beginning of Development	Spermatogenesis. Oogenesis. Fertilization. Parthenogenesis.
III. Early Development	Segmentation Gastrulation Organization of body patterns Neurulation and neural crest Somitogenesis Extraembryonic membranes Gestation and Placentation
IV. Differentiation mechanisms and Organogenesis	Development of the nervous system and sense organs Development of muscle and the tetrapode limbs Development of the vertebrate circulatory system Development of the vertebrate urogenital system
V. Furhter topics of Development	Overview of plant development. Metamorphosis and regeneration Enviromental interactions with animal development Developmental mechanisms in the evolutionary change
Practical lessons	Comparative study of spermatogenesis and oogenesis Studies on Planarian regeneration Observation and study of invertebrate fertilization Observation of fish and amphibian early development Observation of chick early development and organogenesis

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	A1	1	0	1
Guest lecture / keynote speech	A1	21	54.6	75.6
Directed discussion	A29 B4 B8 B11	7	24.5	31.5
Laboratory practice	A4 A26 A30 A31	15	15	30
Short answer questions	A1	2	8	10
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Introductory activities	This session consists of a presentation of the subject, which sets out and explains the purpose and objectives of the subject, its structure, activities, evaluation criteria, etc ... (all contained in summary in the teaching guide) and where student can solve any queries related to them.
Guest lecture / keynote speech	Lectures last 50 minutes and will focus on those relevant topics of the course program, which the student should be read before .

Directed discussion	Each seminar session will be presented and discussed among participants about a scheduled topic. Students should prepare their own theme or part of the intended subject assigned. The proffessor will assist any questions that may arise along the preparation.
Laboratory practice	The practices are an essential complement to the theoretical lessons which addresses some of the processes of animal development and elaborates on some of them.
Short answer questions	The examination shall be written and consist of short answer questions of the contents treated in lectures, seminars and practical lessons.

Personalized attention	
Methodologies	**Description**
Directed discussion	the lecturer will assign a particular topic each student within the general theme for each seminar discussion. Moreover, the student is free to discuss any concerns during the keynote sessions and practices, and also have the opportunity to resolve any questions about these subject or activities in personal tutorials

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Short answer questions	A1	the examination will be written and consist of short answer questions, doing schemas, definitions ...	70
Directed discussion	A29 B4 B8 B11	For each seminar session the student must give the teacher a brief one-page summary including the main ideas of the subject worked. In the seminar session, the ideas in common will be discussed among participants. Both the presentation and the discussion will be valued. The 8 seminars represent the 30 percent of the final grade (each seminar is worth 0,375 points over 10). Abstracts not presented and defended in the seminar session will not be assessed.	30
Others			

Assessment comments
It is not necessary to achieve a minimum score on the topics of discussion and / or consideration for the calculation of the final grade. In the second call only the score of written exam in which knowledge derived from theoretical, practical sessions and seminars will be assessed, will be considered. Exceptionally, under justified reasons (part-time learning or particular learning circumstances), in case the student could not follow the assessment activities, the teacher can adopt appropriate measures aimed not to hurt their score. It will be considered not submitted the student who does not make the final exam based on short answer questions

Sources of information	
Basic	- Gilbert, S.F. (2004, 2014). Biología del Desarrollo/ Developmental Biology. Panamericana/SINAUER - Wolpert, L. (2010/ 2011). Principios del desarrollo/ Principles of Development. Panamericana/ Oxford University Press ENLACES DE INTERÉS: Developmental Biology (8th Edition)The virtual embryoZygoteAmphibian embryology tutorial with QuickTime movies. Anatomy of the 24, 48, 72 and 120 hours Zebrafish (Danio rerio) Embryo. Developmental Biology ON LINE!. Fly Morph-o-genesis Medakafish developmental stage map. Stages of Zebrafish Development The Interactive Fly The Multi-Dimensional Human Embryo. I Embryo ImagesThe Visible Embryo Morphing EmbryosThe Xenopus Molecular Marker ResourceSociety of developmental biology

Complementary	- Browder L.W., Erikson C.A., and Jeffrey W.R. (1991). Developmental Biology. Saunders - Kalthoff, K. (1996). Analysis of Biological Development. Mc Graw-Hill - Müller A.W. (1997). Developmental Biology. Springer-Verlag - Carlson, B.M (2000). Embriología Humana y Biología del Desarrollo.. Harcourt - Gilbert S.F., Epel D (2009). Ecological Developmental biology. Sinauer

Recommendations
Subjects that it is recommended to have taken before
Citoloxía/610G02007 Histoloxía/610G02008 Bioquímica: Bioquímica I/610G02011 Bioquímica: Bioquímica II/610G02012 Xenética/610G02019 Fisioloxía Animal: Fisioloxía Animal I/610G02035 Fisioloxía Animal: Fisioloxía Animal II/610G02036
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
Assistance is recommended to all keynote sessions so as active participation in the seminars. It is very positive to consulted own before the issue to be addressed in the lectures so as to study throughout the course to strengthen knowledge and to better understand the new content that will be treated.