Teaching Guide				
Identifying Data				2019/20
Subject (*)	Microscopic Organography		Code	610G02009
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatory	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Lamas Criado, Iban	E-mail	iban.lamas@udc.es	
Lecturers	Folgueira Otero, Mónica Lamas Criado, Iban	E-mail	m.folgueira@udc.es iban.lamas@udc.es	
Web				
General description	- Study of the basic anatomical structure of the different organs of the body of the upper vascular plants and of the organization of the organic systems of the body of the upper vertebrates (mammalian), to microscopic level. - Bases of the microscopic Organography in upper vegetables. Bases of the microscopic Organography in upper vertebrates (mammalian). - The asignatura is basic for other disciplines like the Physiology (vegetal and animal), Immunology, Pathology and Embryology			

Study programme competences	
Code	Study programme competences
A1	Recoñecer distintos niveis de organización nos sistemas vivos.
A4	Obter, manexar, conservar e observar especímenes.
A5	Analizar e caracterizar mostras de orixe humana.
A11	Identificar e analizar material de orixe biolóxica e as súas anomalías.
A29	Impartir coñecementos de Bioloxía.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
B1	Aprender a aprender.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B6	Organizar e planificar o traballo.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B11	Debater en público.

Learning outcomes			
Learning outcomes	Study programme competences		
Know and they handle the sources of available information (basic and complementary bibliography), the own methodologies of the matter and employ internet for the preparation of the discipline.	A1 A4 A30 A31	B1 B3 B4 B6 B8	

-They purchased the sufficient capacity of synthesis to be able to analyse the relation between the structure and the function of an organo, from a perspective integradora of the knowledges purchased. Also, to recognise the influence of the ambente in the adaptations estructurais that suffer the vegetables and animal the the half, and can apply the theoretical knowledges purchased to the experimental practice.	A1 A5 A11	B1 B3 B6 B8	
-At the end of course expects that the students know the basic anatomical structure of the distinct organs of vegetables and upper animals and recognise the importance of the levels of organisation in his constitution	A1 A5 A11 A29	B1 B3 B4 B8	
- They identify, differentiate and they describe, employing the own terminology of the matter, the components and the structure of the organs, devices and systems of the body of the vegetables and upper animals, using for this the microscopic observation. - They develop a capacity of analise and interpretation of the images observed in the practical classes in microscopic preparations of organos, and of the images obtained in distinct web pages of Internet and worked in the sesions of groups reduced.	A1 A5 A11 A30 A31	B1 B3 B4 B6 B7 B8 B11	

Contents	
Topic	**Sub-topic**
Theory syllabus of Vegetal microscopic organography	Theory syllabus of Vegetal microscopic organography
Topic 1.- The root: Generalities. Histogénesis.	- Primary structure: Internal organization of the root. Origin and development of the lateral roots. - Secondary structure. Anomalous secondary growth.
Topic 2.- The stem: General characteristics. Origin.	- Primary structure: Internal organization of the stem in angiosperms and gymnosperms. Differentiation and distribution of the vascular system. - Typical secondary structure (dicot-and gymnosperms). Secondary growth in monocotiledonean plants. Anomalous secondary growth.
Topic 3.- The leaf: Generalities. Origin and development of the vegetative leaf.	- Organization of the leaves of angiosperms and gymnosperms: Epidermis, mesophill and vascular system. Structure of the petiole. Leaf abscisión. -Structural adaptations of the leaves to the environment.
Topic 4.-The flower. General organization. Origin. Histological structure: sepals and petals. Vascularization.	-Male flower. Structure and histology of the androecium. Microsporogénesis in angiosperms. Polinic tube - Female flower. Structure and histology of the gynoecium. Placentatión. Macrosporogenesis. Fertilization
Theory syllabus of Animal microscopic organography	Theory syllabus of Animal microscopic organography

Topic 5.- Integumentary System (Mammalian skin). Structural characters. Epidermis. Dermis. Hypodermis. Irrigation. Innervatión.	- Cutaneous annexes: Sebaceous and sweat skin glands. Structure of skin appendages: hair follicles and nails.
Topic 6.- Digestive tract of mammal. Generalities and organization.	- Part I. Oral cavity: Lips, palate, tongue. Pharynx. Histological organization of the gut wall. Oesophagus. Stomach: Structure and cell types of the gastric glands (cardial, fundic and pyloric) - Part II. Small intestine: General structure. Villi and crypts. Regional specializations (duodenum, yeyuno and ileon). Large intestine: Structure of the colon, appendix, rectum and anus).
Topic 7.-. Mammal respiratory system. Anatomical organization.	- Part I. Structure of the upper conducting airway : Nose, nasopharinx, larynx, trachea and bronchial tree (until terminal bronchioles) -Part II. Structure of the respiratory portion: respiratory bronchioles, alveolar conducts, alveolar sacs and alveoli. Alveolar septum and the alveolus - capillary complex. Lung: irrigation and inervación.
Topic 8.-Mammal excretory system. Kidney anatomical organization. Structure of the nephron: parts and histological constitution.	- Part I. The renal corpuscle and the filtration barrier. Tubular system: Proximal tubule. Loop of Henle. Distal tubule. Structural features of the juxtaglomerular complex. Mesangium. - Part II. The renal interstice. Collecting tubules and collecting ducts. Urinary tract: renal pelvis, ureter, bladder and urethra. Innervation and irrigation.
Topic 9.-. Male reproductive system of mammals. Testicular histology: Microscopic structure of the seminiferous tubules and interstitial tissue.	- Part I. Excretory genital ducts: Structure of the straight tubules, rete testis, efferent ducts, epididymis, vas deferent, ejaculatory duct. - Part II. Accesory sex glands: Structure of the seminal vesicles, prostate, and bulbouretral glands . Structure of the penis and erectil tissue.
Topic 10.-Female reproductive system. Microscopic structure of the ovary. Development of the ovarian follicles. Corpus luteum. Corpus albicans and interstitial tissue.	- Part I. The genital tract: Oviducts structure, uterus and vagina. Changes in the uterine mucosa - ParteII. The external genitalia organs (vestibule, clitoris and vulva).
Topic 11.- The central nervous system	- Part I. Histogenesis and general organization of the central nervous system of vertebrates. Alar and basal plates. Gray and white matter. The vesicles and encephalic ventricles. Meninges. Microscopic structure of the choroid plexus: The cerebrospinal fluid.. - Part II. Study of the cerebellar cortex and spinal cord.

Topic 12.- The endocrine system of mammals. Introduction.	- Part I. Endocrine glands. Hipophysis: Histogenesis. Organization and cell types of the adenohipophysis. Structure of the neurohypophysis (neurosecretory systems). Pineal gland (Histogenesis and organization). - Part II. Suprarrenales glands (histogenesis and estructural organización of the cortex and medulla). Thyroid and parathyroid glands. - Part II.
-Practical class (laboratory) Syllabus	- Observation and identification of plant tissues and organs in microscopic preparations of roots, stems, leaves and flowers. Interpretation of micrographs and layouts - Observation, identification and interpretation of the different organs in animals and microscopic preparations micrographs
Microscopic Vexetal Organography practices:	- The root. Study of the roots adaptations to the environment: Air (orchid), water (Elodea) and soils plants (lilac). Study of the cross section of the pine young secondary root. - Study of the stem secondary structure: Observation of the cross section of a secondary dicotyledon stem (grape stem). Cross section of Cucurbit secondary stem. - The leaf. Study of leaf adaptations in cross sections of hydrophytes, xerophytes and mesophytes plants. Structure of C3 and C4 plants leaves.
Microscopic Animal Organography practices:	- Study of the Central Nervous System: Microscopic structure of neural cortex of the cerebellum. - The endocrine system: Study of the Hypophysis gland. The adrenal glands. The thyroid gland. - Digestive system: Microscopic study of the of the stomach wall at the fundus level . Study of the small intestine at the level of the duodenum jejunum and ileum Wall specializations . ? Observation of the Large intestine (colon). - Urinary system: Microscopic study of the kidney structure (córtex and medulla levels) - Male Reproductive System: Study of the seminiferous epithelium structure in transverse sections of the seminiferous tubules. -Female Reproductive System: Microscopic study of the ovarian follicles in the ovarian cortex. Corpus luteum, and corpus albicans.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours

Directed discussion	A1 A5 A11 A29 B1 B3 B4 B6 B7 B8 B11	7	17.5	24.5
Laboratory practice	A1 A4 A5 A11 A30 A31 B3 B4 B7 B8	15	21	36
Guest lecture / keynote speech	B8	28	56	84
Introductory activities	B8	1	0	1
Objective test	A1 B8	4	0	4
Personalized attention		0.5	0	0.5
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Directed discussion	-7 compulsory sessions of guided discussion, of 50 minutes of length each one, will be realise. They are addressed to 8 reduced groups of students and are supervised by the professor. In them diverse activities will realise, all of them computable inside the evaluation system: -A) Clarificación of the doubts presented by the student on the contents of the subjet explained in the masterclasses. -B) During each week of the reduced groups sessions, the students will answer a questionnaire, whose subject matter is related to the contents of the subject previously addressed in the corresponding master session and with the contents of the subjet covered in each session of small groups, that will have worked using the recommended bibliography . The questionnaires are available to the student in the Moodle platform, where they will be answered. -C) Interpretation of microscopic images of animal and vegetal organs obtained in several web pages of special histology/organography, where they will treat to identify different appearances of the anatomy of the organs studied . - These sessions allow direct knowledge of the degree of assimilation of the student. They shall be scattered among the keynote lectures and always relate to the content discussed in them, explained above. If given the circumstances that prevent attendance at sessions of guided discussion, these must be notified before the teacher, and must be justified documentary. The calendar devoted to this activity will indicate to beginning of the course.
Laboratory practice	- They will realise 15 compulsory hours of practices of laboratory, distributed in a session of 1 hour and 7 sessions of 2 hours each one. They will be organised 7 groups, in batches of morning (3) and afternoon (4). The calendar of the practices and the schedule will be published during the course. In them the teacher will expose the aims of each practice, will orient the observations of the student, and will clear them the doubts on the identity of the structures observed - They will observe the structure of several organs in preparations of animal and vegetables to optical microscope. In them they will identify several cellular types and tissues in order to know the structure of the organs object of study . For this, they will have microscopes and access to atlas, texts books and to specific pages of internet. - In occasions, will resolve a questionnaire related with their observations. - Also they will tackle theoretical appearances concernientes to the experimental methodology that employs in the asignatura, so that the student purchase the own manual skills of the anatomical techniques. - In case to give circumstances that prevent the attendance to the practices, these must be notified prior to the professor, and will have to be properly justified documentary.
Guest lecture / keynote speech	Along the cuatrimestre will give 28 lessons magistrales compulsory of 50 minutes of length to a wide group of students, at a rate of 2 sessions by week, in groups of morning and afternoon. The lessons will treat on the basic theoretical contents of the program, that the professor will explain helping of drawings, images and of audiovisual means (presentations with computer). Also they will resolve punctual questions posed by the students. For an elder aprovechamiento of these sessions, advises that the student review the knowledges of Vegetal and Animal Histology purchased in the previous course and read previously the fundamental appearances of the lessons in the bibliographic texts recommended will develop according to the calendar approved by the Board of Faculty.

Introductory activities	It will devote a first session to the presentation of the subjet where will expose the distinct sections of the educational guide (structuring, competitions, program-contents, planning, methodology, evaluation, bibliographic resources, etc.) and where the student will be able to pose any doubt or relative question to the same. Likewise it will put to disposal of the student a cronograma detailed of the activities to develop during the cuatrimestre and a complete version of the educational guide in the platform Moodle.
Objective test	It will realise a final examination on the theoretical and practical contents of the subjet, in the official date fixed by the Board of Faculty. - The students that have not surpassed the official examination of the Announcement of May, or have not presented to the same will be able to examine in the Announcement of Julio.

Personalized attention	
Methodologies	**Description**
Guest lecture / keynote speech Laboratory practice Introductory activities Objective test Directed discussion	The student/to can consult his punctual doubts during the magistral sessions , and more at length, in the sessions of directed discussion. Besides, it will be able to resolve any doubt related with the matter, or with his activities, assisting to the personalised tutorías that will develop during the course, in a schedule that will specify the professor to the beginning of the cuatrimestre. Given the purpose of these tutorías (know and resolve the difficulties that the student finds in the asignatura), will procure that the schedule was the most convenient for both, concertándolo previously the time that both estimate necessary.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Laboratory practice	A1 A4 A5 A11 A30 A31 B3 B4 B7 B8	- It values the assistance, participation, initiative, attention, behaviour and opinions developed in the activities realised during the practical classes (location, identification and interpretation of microscopic preparations of animal and vegetal organs).	20

Objective test	A1 B8	- The assistance to all the practical classes and sessions of groups reduced is indispensable to surpass the asignatura. - In this asignatura will not realise partial examinations. - In the announcement of May, The final examination (theory and practical) supposes 80% of the final qualification. Of this percentage 80% corresponds to the theoretical examination and 20% to the practical examination. - The evaluation of the theoretical part of the matter, comes determined by the theoretical examination, that will consist of short questions and of questions type test of multiple election on the contents of the masterclasses and sessions of tutoría of groups reduced. Also they will be able to include questions headed to the interpretation of theoretical figures. If the examination is of type test, only will describe the replies realised exclusively in the staff attaches to the examination. - The evaluation of the contents developed during the practical classes of laboratory, will carry out by means of an exámen practical in which it will value the identification and description of microscopic preparations, equal or different of the studied in the practical classes, and that they will be answered exclusively in the space reserved for this. - The students that have not surpassed the official examination of the Announcement of May, or have not presented to the same will be able to examine in the Announcement of Julio. _ With the objective proof, the student will show the degree of knowledge and skills purchased along the course, asi like the capacity of synthesis and abstraction developed.	64
Directed discussion	A1 A5 A11 A29 B1 B3 B4 B6 B7 B8 B11	- It values the assistance, participation, attention and behaviour of the student in all the activities developed during the sessions of directed discussion (questionnaires, interpretation of microscopic images of organs, exhibition of doubts).	16

Assessment comments

The evaluation of the subject is based on an examination of theoretical content, an examination of practical content, and a continuous evaluation of all the activities developed during the sessions of the small groups. The attendance to the practical classes is an essential condition to be evaluated. In the May session there will be a theoretical-practical final exam for the evaluation of learning. All the training activities will have a score between 0 and 10 points. To calculate the final grade, the following criteria will be taken into account: 1. Evaluation of theoretical learning. The mark obtained in this section will represent 80% of the final grade of the theory part. 2. Evaluation of practical learning. The mark obtained in this section will be 20% of the final grade. 3. The grade obtained in the seminar exam will be 20% of the final grade of the theoretical section. To pass the subject in the May session, the global sum of the mentioned sections must be between 5 and 10 points, being necessary to obtain at least 5 points in each of the two sections. If this requirement is not met, the final grade would correspond to that of the section with the least value. Students who do not pass the subject in the May session, or have not submitted to it, may try again in the July test. In this case, the evaluation will consist of: 1. In a written test about the theoretical contents of the subject as well as the directed discussion sessions made by the students. The grade obtained in this section (between 0 and 10 points) will represent 80% of the final grade. 2. In a practical test of the same nature as mentioned above. The mark obtained in this section (between 0 and 10 points) will be 20% of the final grade. To overcome the subject in the July session, the overall sum of the mentioned sections must be between 5 and 10 points, being It is necessary to obtain at least 5 points in each of the two sections. If this requirement is not met, the final grade would correspond to that of the section with the least value. The grade of NOT PRESENTED, will be applied only in the case that the student does not perform any of the objective tests during the semester or the final exam of both the May and the July opportunities.

Sources of information	
Basic	Bibliografía básica Organografía Vegetal: PANIAGUA, R.; NISTAL, M.; SESMA, P.; ÁLVAREZ-URÍA, M.; ANADÓN, R.; FRAILE, B.; SÁEZ, FJ. (2007). Citología e Histología Vegetal y Animal: Histología vegetal y animal (Vol.2). Ed. McGraw Hill Interamericana. 4ª Edición. (Catalogado en la Biblioteca de la Facultad con la signatura BC-108) Organografía Animal: Ross, M. H; Wojciech, P. (2012). Histología: Texto y atlas color con Biología Celular y Molecular. Buenos Aires: Médica Panamericana. 6ª ed. (Catalogado en la Biblioteca de la Facultadc on la signatura BC-381).Welsch, U. (2008). Histología / Sobotta ; Welsch . Ed. Médica Panamericana. 2ª Edición. (Catalogado en la Biblioteca de la Facultad con la signatura BC-551a-h) . GENESER F. (2000). Histología sobre bases biomoleculares Ed. Médica Panamericana. 3ª Edición

Complementary	Bibliografía complementaria BOWES, BG; MAUSETH, JD. (2008). ?Plant structure. A colour guide". Ed. Manson publishing, Londres. 2ª edición.CUTLER, D.F,; BOTHA,T; STEVENSON, D.WM (2008). ?Plant anatomy. An applied approach? Ed. Blackwell Publishing. (Catalogado en la Bibliotecade la Facultad con la signatura BC-545-a y 545-b). DICKISON, W.C. (2000). Integrative plant anatomy. Ed. Harcourt/Academic Press: San Diego. ESAU, K. (1987). "Anatomía de las plantas con semillas". Buenos aires: Editorial Hemisferio SurEVERT, R.F. (2008). Esau Anatomía vegetal. Meristemas, células y tejidos de las plantas: su estructura, función y desarrollo. Ed. Omega. 3ª Edición .FAHN, A. (1990). "Plant Anatomy". Pergamon Press: Oxford.FAWCETT D, JENSH, RP. (1999). Compendio de Histología. Interamericana de España/McGraw-Hill, Madrid. (Libro catalogado en la Biblioteca de la Facultadcon la signatura BC-380). GÓMEZ SEGADE, P. (2012). ?Atlas de Histología Vegetal". Lulu: Madrid.JUNQUEIRA LC, CARNEIRO J. (2006)." Histología Básica. Texto y atlas". 6ªed. Masson: Barcelona. (Libro catalogado en la Biblioteca de la Facultad con la signatura BC-185; BC-186; BC-187). KIERSZENBAUM, A.L.; TRESS, LL (2011). ?Histología y Biología Celular. Introducción a la AnatomíaPatológica?Ed. Elsevier.Mosby.3ªed. .RUDALL, P. (2007). ?Anatomy of flowering plants: an introduction to structure and development ?/ Paula J. Rudall. Cambrigde:Cambridge University Press. 3rd ed. (Catalogado en la Biblioteca de la Facultad con la signatura BC-547). Bibliografía para prácticas BOWES, B.G.; Mauseth, J.D. (2008). Plant structure: a colour guide. 2nd ed.Manson Publishing: London BOYA VEGUE, J. (2011). Atlas de histología y Organografía microscópica. 3ª ed. Editorial Médica Panamericana: Madriid. (Catalogado en la Bibliotecade la Facultad con la signatura BC-420) Gartner, L. P. (2011). Atlas en color de histología / Leslie P.Gartner, James L. Hiatt. 5ªed. Madrid: Panamericana. (Catalogado en la Biblioteca de la Facultad con la signatura BC-310). GENESER, F. (1995).?Atlas color de Histología?. Editorial Médica Panamericana.(Catalogado en la Bibliotecade la Facultad con la signatura BC-468) KÜHNEL, W. (2005).Atlas color de Citología e Histología. 11ª ed. Editorial Médica Panamericana: Madrid (Catalogado en la Biblioteca de la Facultad con la signatura BC-493). ROSS, MH; PAWLINA, W; BARNASH, T.A. (2012). "Atlas de Histología descriptiva". ed. Editorial Médica Panamericana: Buenos Aires. WHEATER, P. R. (1987). Histología funcional : texto y atlas en color/ Raul R. Wheather, H. George Burkitt, Víctor G. Daniels. Barcelona: Jims, D.L. 2ªed. Rev. (Catalogado en la Bibliotecade la Facultad con la signatura BC-14) YOUNG, B. (2000, 2010 imp). ?Wheater's histología funcional texto y atlas en color?/ Barbara Young, John W. Heath. Madrid: Elsevier Science. (Catalogado en la Biblioteca de la Facultad con la signatura BC-122).Recursos webGeneraleshttp://books.google.es/http://www.ncbi.nlm.nih.gov/pubmedOrganografía Vegetalhttp://www.emc.maricopa.edu/faculty/farabee/biobk/BioBookPLANTANAT.htmlhttp://www.emc.maricopa.edu/faculty/farabee/biobk/BioBookPLANTANATII.htmlhttp://www.biologia.edu.ar/botanica/index.htmlhttp://images.botany.org/http://www.dipbot.unict.it/tavole_es/indice.htmlhttp://atlasveg.ib.usp.br/http://mazinger.sisib.uchile.cl/repositorio/ww/ciencias_agronomicas/anatomia-vegetal/index.html.http://www.sbs.utexas.edu/mauseth/weblab/ http://www.ujaen.es/investiga/atlas/Organografía Animalhttp://www.kumc.edu/instruction/medicine/anatomy/histoweb/http://www.meddean.luc.edu/lumen/MedEd/Histo/frames/histo_frames.htmlhttp://www.udel.edu/Biology/Wags/histopage/histopage.htmhttp://escuela.med.puc.cl/publ/Histologia/Indice.html http://acd.ufrj.br/labhac/fotoslistagem.htmhttp://www.bu.edu/histology/m/i_main00.htmhttps://histo.life.illinois.edu/histo/atlas/index.phphttp://webs.uvigo.es/mmegias/inicio.htmlhttp://virtual.ujaen.es/atlas/

Recommendations
Subjects that it is recommended to have taken before
Biology: Basic Levels of Organisation of Life I (Cells)/610G02007
Biology: Basic Levels of Organisation of Life II (Tissues)/610G02008
Introduction to Botany: General Botany/610G02023
Subjects that are recommended to be taken simultaneously
Zoology II/610G02032
Plant Physiology II/610G02028
Subjects that continue the syllabus
Developmental Biology/610G02010
Animal Physiology I/610G02035
Animal Physiology II/610G02036

Other comments
It is recommend: The assistance to the masterclasses, sessions of directed discussion and practical classes of laboratory, and the active participation in this activities along the course, to ensure that they comprise; the terms and concepts to which does reference. The not presential work of the student preparing previously the theoretical and practical class, helping itself with the recommended bibliography and of the web resources on that they will put to his disposition. The weekly review of the matter given to understand the information obtained in class. Clarify with the teacher the possible doubts in the individualized tutorships or in group, which will facilitate the understanding of the matter and will help to the preparation of the proposed activities. It is important to devoted special attention to the observation of photos and images in books, atlases and in practice microscopical preparations; to try to recognize in them what is described in the text or in the theoretical class. It advises to cover the foot of the photo and try to make a self diagnostic of the image that is observed (autoevaluation). The periodic visit to the web page of the subject (Moodle platfform), where links and material used in lectures will be inserted.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.