Teaching Guide				
Identifying Data				2021/22
Subject (*)	Cell Biology		Code	610G04003
Study programme	Grao en Nanociencia e Nanotecnoloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Díaz Prado, María Luz	E-mail	luz.diaz@udc.es	
Lecturers	Castro Castro, Antonio Manuel Díaz Prado, María Luz Vaamonde García, Carlos	E-mail	antonio.castro@udc.es luz.diaz@udc.es carlos.vaamonde.garcia@udc.es	
Web	campusvirtual.udc.gal			
General description	The subject is in the first year of the Degree, and the only precedent that most students have is Biology knowledge taken during Secondary Education. Cell Biology is included in the Basic Training module, therefore it is framed in the first semester of the first year of the Degree, in order to provide students with the basic knowledge and basic skills necessary for other subjects. In Cell Biology, different aspects of cells are studied in an integrated way and not only the merely structural one.			

Contingency plan	1. Modifications to the contents No changes are planned in the contents. 2. Methodologies *Teaching methodologies that are maintained The teaching methodologies described in this teaching guide will be maintained, but will be adapted to the online modality. *Teaching methodologies that are modified The methodology will be adapted to the telematic modality, carried out through Microsoft Teams. In addition, all the material to be used will be made available to students on the Moodle platform. The laboratory practices will be adapted to the existing circumstances and, if necessary, will be replaced by non-contact activities (viewing of methodological videos, study of microscopy images, case studies, analysis and interpretation of data ...). The tests or exams will be carried out through the Campus Virtual platform. The doubts that are raised to the students will be dealt with electronically. 3. Mechanisms for personalized attention to students Personalized attention will be limited to telematic means. Campus Virtual: whenever it is required (according to the student's need or demand). Microsoft Teams: whenever it is required (according to the student's need or demand). E-mail: whenever required (at the request of the student body). Use to make inquiries, request virtual meetings to resolve doubts or other clarifications related to the matter. 4. Modifications in the evaluation The evaluation system included in the teaching guide is maintained, although the tests will be carried out electronically through Campus Virtual. *Evaluation observations: The evaluation criteria and the observations collected in the teaching guide are maintained. 5. Modifications to the bibliography or webgraphy No modifications are foreseen. If necessary, supplementary means will be provided. 6. OBSERVATIONS ON THE CAPACITY OF THE CLASSROOMS AND LABORATORIES: in the event of capacity problems in the spaces designated for the realization of face-to-face activities, additional spaces will be reserved in which students can follow the activities through the TEAMS platform. In the case of practical activities, the groups will be divided to adapt to the capacity of the laboratory.

Study programme competences	
Code	Study programme competences
A3	CE3 - Reconocer y analizar problemas físicos, químicos, matemáticos, biológicos en el ámbito de la Nanociencia y Nanotecnología, así como plantear respuestas o trabajos adecuados para su resolución, incluyendo el uso de fuentes bibliográficas.
A6	CE6 - Manipular instrumentación y material propios de laboratorios para ensayos físicos, químicos y biológicos en el estudio y análisis de fenómenos en la nanoescala.
A7	CE7 - Interpretar los datos obtenidos mediante medidas experimentales y simulaciones, incluyendo el uso de herramientas informáticas, identificar su significado y relacionarlos con las teorías químicas, físicas o biológicas apropiadas.
A8	CE8 - Aplicar las normas generales de seguridad y funcionamiento de un laboratorio y las normativas específicas para la manipulación de la instrumentación y de los productos y nanomateriales.
B3	CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética

B4	CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado
B6	CG1 - Aprender a aprender
B8	CG3 - Aplicar un pensamiento crítico, lógico y creativo.
C3	CT3 - Utilizar las herramientas básicas de las tecnologías de la información y las comunicaciones (TIC) necesarias para el ejercicio de su profesión y para el aprendizaje a lo largo de su vida
C7	CT7 - Desarrollar la capacidad de trabajar en equipos interdisciplinares o transdisciplinares, para ofrecer propuestas que contribuyan a un desarrollo sostenible ambiental, económico, político y social.
C8	CT8 - Valorar la importancia que tiene la investigación, la innovación y el desarrollo tecnológico en el avance socioeconómico y cultural de la sociedad

Learning outcomes			
Learning outcomes	Study programme competences		
Identify the main cellular components, their functions and their structure.		B3 B4 B6 B8	C3
Distinguish the mechanisms that underlie the dynamics of the vital and social processes of cells.		B3 B4 B6 B8	C3
Handle biological and instrumental material typical of a Cell Biology laboratory.	A6 A7 A8	B6	
Solve basic problems of Cell Biology.	A3 A7	B3 B8	C7 C8
Know and become familiar with the methodologies, bibliographic sources and technical terms of Cell Biology, using, in certain cases, the scientific method for their study.	A3 A7	B3 B4 B8	C3 C7 C8

Contents	
Topic	Sub-topic
Unit 1. Introduction.	Concept and historical background of Cell Biology. Organization levels and clasification of life. Acellular systems.
Unit 2. Molecular composition of the cell.	Carbohydrates. Lipids. Proteins Enzymes. Nucleic acids.
Unit 3. Cell membrane.	Structure and organization of biological membranes. Transport of molecules across the membrane.
Unit 4. The cell surface.	Extracellular matrix. Cell adhesion and cellular junctions.
Unit 5. Cytosol and cytoskeleton.	Cytosol. Cytoskeleton. Complex microtubular structures.

Unit 6. Cellular organelles I. Synthesis and degradation of macromolecules.	Ribosomes. Endoplasmic reticulum. Golgi complex. Lysosomes.
Unit 7. Cellular organelles II. Energy conversion	Mitochondria. Plastids. Peroxisomes.
Unit 8. The organization of cellular genomes.	The cell nucleus. Chromatin. Chromosomes.
Unit 9. The cell cycle.	The cell cycle Mitosis and cytokinesis Meiosis The programmed cell death.
Unit 10. Cell communication and cell signaling	Direct contact. Chemical messengers.
Unit 11. Cell differentiation and tissue organization.	Cell differentiation. Organization of cells into tissues. Animal tissues. Vegetable tissues.
PRACTICAL LESSONS (Laboratory practices)	- Recognition of carbohydrates, lipids, proteins and enzymes. - Study of fungi and protozoa (Protista). - Observation and study of animal cells. - Observation and study of plant cells. - Observation and study of plant subcellular structures. - Study of osmotic phenomena. - Study of cell division: mitosis. - Processing of samples for light microscopy. - Observation and study of plant and animal tissues.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	C8	1	0	1
Guest lecture / keynote speech	A3 B6 B8 C3 C8	28	56	84
Laboratory practice	A3 A6 A7 A8 B3 B4 C7	15	30	45
Objective test	A3 B3 B4 B6 B8 C8	3	0	3
Mixed objective/subjective test	A3 B3 B4 B8 C8	4	0	4
Collaborative learning	A3 B3 B4 C3 C7	4	4	8
Seminar	B4 B8 C7	2	2	4
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	It consists of a presentation session of the subject where the different sections contained in the teaching guide are exposed and explained (competences, program-contents, planning, methodology, evaluation, bibliographic resources, etc.) and where the students can propose any doubt or question related to them. Both the teaching guide of the subject and the calendars and times of the course will be available on the Moodle platform and on the website of the Faculty of Sciences of the UDC.
Guest lecture / keynote speech	50-minute face-to-face sessions on the basic content of the program. The teacher will explain the theoretical foundations of the subject through drawings, diagrams or computer presentations (content that will be made available to students through the Moodle platform). The teacher will also solve the doubts and questions raised by the students. Likewise, in order to take full advantage of these, it is recommended that the students have previously reviewed the fundamental aspects of these topics in the recommended texts and completed the relative questionnaires regarding the same.
Laboratory practice	In laboratory practices, in addition to addressing some theoretical aspects related to experimental methodologies, the manual skills typical of simple Cell Biology techniques are acquired. The student must make a report detailing the objective of each practice, the protocol followed and the results. In addition, you must describe, draw and interpret the observations made. This memory will represent 20% of the final grade for the course. Attendance at practices is a necessary condition to be evaluated. In the event of circumstances that prevent attendance, these must be communicated in advance to the teacher in charge or duly justified. During these sessions, the teacher will present the objectives of the practice and guide the observations of the students, clarifying the doubts that arise.
Objective test	2 of the sessions in small groups will be devoted to conducting objective tests, in order to know the degree of assimilation of the content taught. The activities delivered will be resolved in small groups, assuming the same 10% of the final grade.
Mixed objective/subjective test	This category includes both the partial / learning controls that will be carried out throughout the course, as well as the final exam on the theoretical and practical contents of the subject, all of them with test-type and / or short-answer questions (or relatively short) on the contents of the master classes and sessions in small groups. In this way, it will be possible to know the way in which the students are assimilating the contents and improve the processes in progress and the performance achieved.
Collaborative learning	Throughout the semester, 4 sessions will be dedicated to working in small groups (10-12 students). During the sessions, various topics related to the contents of the subject will be discussed and discussed, and activities related to them will be carried out, for which specific bibliography will be used (printed or through the use of electronic resources).
Seminar	In small groups of 10-12 students, they will work on a topic on the agenda designated in advance by the teacher, and of which each student will prepare a summary / outline / glossary of terms, which will give a written copy to the teacher at the end of the session . The session consists of the teacher-led sharing of what the group's students have extracted from their previous work on this topic. There will be 2 sessions throughout the semester, both the delivery of the summary / outline / glossary of terms, as well as the active participation of the students computes 10% of the final grade for the course, with 5% corresponding to each of the sessions.

Personalized attention	
Methodologies	**Description**
Laboratory practice Seminar Collaborative learning	The students are free to consult all their doubts during the theoretical sessions (lectures, small groups) and practices. In addition, you will have the possibility of solving any questions related to the subject or the activities in the personalized tutorials. In the case of students with recognition of part-time dedication, they may raise questions by attending individualized tutorials or via email. STUDENTS WITH RECOGNITION OF DEDICATION TO PART TIME AND ACADEMIC DISPENSE OF EXEMPTION FROM ASSISTANCE: Both in the final opportunity of the semester and in the second opportunity, the grade obtained in the theoretical exam and the corresponding to the practical exam, will be taken into account for the calculation of the overall grade, representing 80% and 20% ofthe final grade, respectively.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	A3 A6 A7 A8 B3 B4 C7	After finishing the period of Laboratory Practices, a written exam (compulsory) will be carried out on the practical contents of the subject, consisting of short questions and images to identify. This exam represents 20% of the overall grade.	20
Mixed objective/subjective test	A3 B3 B4 B8 C8	There will be two written and liberatory theoretical partial exams throughout the semester. Each of them will represent 30% of the final grade for the course. There will also be a theoretical final exam for those students who have not passed these partial exams or who have not submitted to them. In this case, the final exam will account for 60% of the final grade for the course. The theoretical exams will consist of test questions (multiple choice) and / or short answer about the contents of the master classes and small group sessions.	60
Objective test	A3 B3 B4 B6 B8 C8	There will be 2 written tests throughout the quaryer. These tests will consist of a combination of different types of questions: multiple choice, short answer, essay type, identification of schemes / images, completion and / or association.	10
Seminar	B4 B8 C7	At the end of each of the two seminar session, the student must provide a summary / outline / glossary of terms on the subject of the agenda designated in advance by the teacher. Likewise, there will be a discussion by the teacher of what the students have extracted from their previous work on this topic. Both the delivery of the summary / outline / glossary and active participation compute for the final grade of the subject; each session will account for 5% of it.	10

Assessment comments
GENERAL CONSIDERATIONS Attendance at practices is a necessary condition for the consideration of submitted and to be able to take the final exam of the subject. Failure to attend more than 25% of the laboratory practices WITHOUT justification, will be considered Not Presented. Students will have two official opportunities to pass the subject. Likewise, there will be 2 liberatory theoretical partial exams throughout the semester. The grade of Not Presented will be applied inthe event that the student does not appear for the corresponding tests in the official assessment opportunities or does not carry out the laboratory practices. EVALUATION ASPECTS AND CRITERIA 1. STUDENTS WITH FULL DEDICATION In the final quarter opportunity, the different sections included in the evaluation system will be taken into account for the computation of the final grade, each of which must be passed to proceed to the calculation of the final grade. There will be two theoretical and written partial exams (each computes 30% of the final grade), as well as a final exam for those students who have not passed these partial exams or who have not submitted to them, representing 60% of the final grade . The exam of the practical contents will suppose 20% of the global qualification. Both the objective tests and the seminar sessions will each represent 10% of the final grade . On the second opportunity, the theoretical (as a awhole) and /or practical parts not passed may be recovered, assuming 80% and 20% of the final grade, respectively. 2. STUDENTS WITH RECOGNITION OF DEDICATION TO PART TIME AND ACADEMIC DISPENSE OF EXEMPTION FROMASSISTANCE Both in the final opportunity of the semester and in the second opportunity, the grade obtained in the theoretical exam and the one corresponding to practical exam will be taken into account for the calculation of the overall grade, representing 80% and 20% ofthe final grade, respectively. NOTES: For the qualifications in the different activities subject to evaluation to be taken into account, it is necessary to pass (reach 50% of the qualification) each of the sections / tests that make up said evaluation system. If this score is not reached in any of them and even if the average of the different sections / tests is equal to or greater than 5 (out of 10), the subject will appear as a failure and the grade will be 4.9.

Sources of information	
Basic	BIBLIOGRAFÍA BÁSICAAlberts, B. y col. (2011). Introducción a la Biología celular. Ed. Médica Panamericana.Alberts, B.; Johnson A.; Lewis, J.; Raff, M.; Roberts, R. & Walter, P (2004). Biología Molecular de la célula. Ed. Omega.Cooper, GM. (2010). La célula. Ed. Marbán.Freeman, Scott y col. (2009) (2010). Fundamentos de Biología. Ed. Pearson.Karp, G. (2009). Biología Celular y Molecular. Ed. McGraw-Hill. InteramericanaPaniagua, Ricardo y col. (2007). Biología Celular. Ed. McGraw-Hill Interamericana.Paniagua, R, Nistal, M, Sesma, P, Álvarez-Uría, M, Fraile, B, Anadón, R; Sáez FJ. (2007). Citología e Histología Vegetal y Animal, 4ª edición, Ed. McGraw-Hill Interamericana, Madrid.BIBLIOGRAFÍA COMPLEMENTARIAPlatner, H.; Hentschel, J. (2011). Biología Celular. Ed. Panamericana.Lodish, H.; Berk, A.; Zypursky, S.; Matsudaira, P.; Baltimore, D.; Darnell, J. (2005). Biología Celular y Molecular. Ed. PanamericanaPollard, T.D; Earnshaw WC. (2002, 2008). Cell Biology. Ed. Saunders.Curtis, H; Barnes, N.S; Schnek, A; Flores, G. (2006) (2008). Biología. Ed. Panamericana.Álvarez Nogal, R. 2008, Prácticas de citología-histología de plantas y animales, Universidad de León-Secretariado de Publicaciones, León.Olmos, G, Miralles, A. 2003, Prácticas de citología e histología, Universitat de les Illes Balears, Palma (Islas Baleares).Montuenga, L, Esteban, FJ; Calvo, A. 2009. Técnicas en histología y biología celular. Ed. Elsevier-Masson.WEBGRAFÍAhttp://www.ncbi.nlm.nih.gov/books/https://www.ncbi.nlm.nih.gov/pubmedhttps://books.google.es/http://webs.uvigo.es/mmegias/inicio.htmlhttp://www.uni-mainz.de/FB/Medizin/Anatomie/workshop/EM/EMAtlas.html http://www.lab.anhb.uwa.edu.au/mb140/ http://histologyatlas.wisc.edu/ http://campus.usal.es/~histologia/histologia.htmhttps://m.youtube.com/watch?v=_yKtfi-LOKw
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
The adaptation to the first year of university education supposes an important effort for every student. The learning will include aspects such as: incorporation of fundamental concepts, familiarization with the work in the laboratory, elaboration of simple memories of practices, elaboration and exposition of summaries / schemes / glossaries of terms and the search for information. Therefore, constant study and periodic reviews as the course progresses are very important. It is recommended to work on the subject of the master classes beforehand, as well as taking the relevant notes during them.It is recommended to limit the delivery of woks to computer sopport to comply with Green Campus program of the Faculty.