UNIVERSIDADE DA CORUÑA

| Teaching Guide | | | | |
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| Identifying Data | | | | 2021/22 |
| Subject (*) | Cellular Techniques | | Code | 610441001s |
| Study programme | Máster Universitario en Bioloxía Molecular, Celular e Xenética (semipresencial) | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Official Master's Degree | 1st four-month period | First | Obligatory | 6 |
| Language | SpanishGalicianEnglish | | | |
| Teaching method | Hybrid | | | |
| Prerequisites | | | | |
| Department | BioloxíaDepartamento profesorado máster | | | |
| Coordinador | Bernal Pita da Veiga, María de los Ángeles | E-mail | angeles.bernal@udc.es | |
| Lecturers | Bernal Pita da Veiga, María de los Ángeles<br>Castro Castro, Antonio Manuel<br>Folgueira Otero, Mónica<br>Insua Pombo, Ana Maria<br>López Armada, María José<br>Rioboo Blanco, Carmen<br>Yañez Sanchez, Julian | E-mail | angeles.bernal@udc.es<br>antonio.castro@udc.es<br>m.folgueira@udc.es<br>ana.insua@udc.es<br><br>carmen.rioboo@udc.es<br>julian.yanez@udc.es | |
| Web | campusvirtual.udc.gal/login/index.php | | | |
| General description | Experimental subject focused on microscopy (including image analysis), plant and animal cell culture, flow cytometry and cytogenetic techniques. | | | |
| Contingency plan | In the event that circumstances limit or prevent the access to the facilities of the Faculty, a hybrid or nonattendance teaching method would be adopted, respectively, with the following specifications.<br>1. Modifications in the contents.<br>Contents would not be modified in any case.<br>2. Methodologies<br>* Teaching methodologies that are maintained<br>The methodologies described will be maintained in both modalities.<br>* Teaching methodologies that change<br>If necessary, synchronous means of communication (MSTeams, ...) will be used in teaching activities that involve face-to-face teaching method.<br>Practical sessions in the laboratory will be adapted to the circumstances; if necessary, they will be replaced partial (in the hybrid model) or totally (in the non-attendance modality) by non-attendance activities (video viewing, case studies, data analysis and interpretation, ...)<br>3. Mechanisms for personalized attention to students.<br>Personalized attention will be limited to telematic means (email, Moodle, MSTeams, ...)<br>4. Modifications in the evaluation.<br>Criteria and methodologies for evaluation will be maintained in both modalities.<br>* Evaluation observations:<br>Assessments will be carried out electronically in both modalities<br>5. Modifications to the bibliography or webography.<br>If necessary, complementary sources or means of free access would be provided.<br><br>(ii) planned Adaptation in the centre for the cases in which it surpass the aforo of the classroom assigned for the matter: Attribution of two or more classrooms to the matter and impartición of the class through TEAMS for the students that was not in the classroom with the professor.<br>In the case of the practical activities, the groups will unfold to adapt to the capacity of the laboratory. | | | |

| Study programme competences / results |
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| Code | Study programme competences / results |
|---|---|
| A1 | Skills of working in a sure way in the laboratories knowing operation handbooks and actions to avoid incidents of risk. |
| A2 | Skills of using usual techniques and instruments in the cellular, biological and molecular research: that are able to use techniques and instruments as well as understanding potentials of their uses and applications. |
| A13 | Skills to become a professional in health, pharmacy, veterinary, animal production, biotechnology or food sectors. |
| B3 | Skills of management of the information: that are able to gather and to understand relevant information and results, obtaining conclusions and to prepare reasoned reports on scientific and biotechnological questions |
| B4 | Organization and work planning skills: that are able to manage the use of the time as well as available resources and to organize the work in the laboratory. |
| C1 | Ability to express oneself correctly, both orally and in writing, in the official languages of the autonomous community |
| C3 | Using ICT in working contexts and lifelong learning. |
| C8 | Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society. |
| C9 | Ability to manage times and resources: developing plans, prioritizing activities, identifying critical points, establishing goals and accomplishing them. |

| Learning outcomes | | | |
|---|---|---|---|
| Learning outcomes | Study programme competences / results | | |
| To understand the theoretical foundations on which microscopy (including image analysis), (plant and animal) cell culture, flow cytometry and cytogenetic techniques are based. | AR1<br>AR2 | | |
| To acquire basic skills in the management and use of instrumental and units required for the development of cellular techniques. | AR1<br>AR2<br>AR13 | | |
| To know the applications of the different cellular techniques. | AR2 | | |
| To design, plan and conduct experiments regarding the techniques learned. | AR1<br>AR2 | BR3<br>BR4 | |
| Adequate oral and written expression in the official languages<br>Using ICT in working contexts and lifelong learning<br>Ability to manage times and resources: developing plans, prioritizing activities, identifying critical points, establishing goals and accomplishing them | | | CC1<br>CC3<br>CC8<br>CC9 |

| Contents | |
|---|---|
| Topic | Sub-topic |
| Microscopy and image analysis | Fundamentals, techniques and applications of light and electron microscopy. Fluorescence and confocal scanning microscopy: advanced techniques and applications. Introduction to image processing and image analysis |
| Cellular cultures | Introduction to cell cultures. Types of cell cultures. Cell culture requirements. Quantification of cellular parameters. Contamination. Cytotoxicity.<br>In vitro cultures of plant tissues. Callus. Cultivation of plant cells in suspension. |
| Flow cytometry | General principles and methods of cytometry. Sample preparation and standardization of analysis procedures. Functional analysis of cells. |
| Cytogenetic techniques | Chromosome preparation and karyotype. Conventional in situ hybridization. Advanced techniques of fluorescence in situ hybridization (FISH). |

| Planning | | | | |
|---|---|---|---|---|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Document analysis | A2 | 0 | 40 | 40 |
| Laboratory practice | A1 A2 A13 B3 B4 | 28 | 42 | 70 |

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|---|---|---|---|---|
| Supervised projects | A2 B3 B4 C9 C8 C3 C1 | 0 | 19 | 19 |
| Mixed objective/subjective test | A2 B3 | 2 | 15 | 17 |
| Personalized attention | | 4 | 0 | 4 |
| **(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.** | | | | |

| Methodologies | |
|---|---|
| **Methodologies** | **Description** |
| Document analysis | This methodology involves watching videos of lectures, reading documents prepared by the lecturers and/or reading bibliographic documents on the theoretical-practical fundamentals and aspects related to the different techniques used in Cell Biology. |
| Laboratory practice | Practical sessions represent an indispensable part of the course, in which practical aspects and applications of the different cellular techniques will be approached. Practical sessions will be developed in concrete laboratories and places: laboratories of the Faculty of Sciences, Laboratories of Biomedical Research Institute (INIBIC), Scientific Research Support Services (SAI) of UDC.<br>Students will develop laboratory protocols and attend demonstrations about the use of research units. |
| Supervised projects | Students must carry out works, resolve problems and/or questions about specific aspects of the techniques used. |
| Mixed objective/subjective test | It will consist of a written exam with questions-test and/or short answer questions about theoretical and practical contents and applications of the cellular techniques. |

| Personalized attention | |
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| **Methodologies** | **Description** |
| Supervised projects<br>Document analysis | Students (individually or in small groups) may consult their doubts about the contents and activities of the subject via phone and/or electronic support.<br><br>A forum on the Virtual Campus/Teams may be used for the formulation of doubts/comments. |

| Assessment | | | |
|---|---|---|---|
| **Methodologies** | **Competencies / Results** | **Description** | **Qualification** |
| Supervised projects | A2 B3 B4 C9 C8 C3 C1 | The ability to design (and plan) experiments, interpretate data and solve problems will be assessed. | 30 |
| Mixed objective/subjective test | A2 B3 | The acquisition of knowledge about the theoretical foundations and applications, clarity of explanations, ability to integrate and link information handled and the ability to interpret data and solve problems will be taken into account. | 50 |
| Laboratory practice | A1 A2 A13 B3 B4 | Attendance, skill in scheduled tasks and knowledge of the potential risks in laboratory practices will be assessed. | 20 |

| Assessment comments |
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| The mixed test will take place through the Virtual Campus on the dates and at the times set out in the timetable.<br>In order to be evaluated, students must attend to practical sessions.<br>In<br>july there is the opportunity to retake only the tests. The january's<br>score of supervised projects and practices are maintained.<br>Preferably, first class honors will be awarded in january.<br>The fraudulent realisation of the proofs or activities of<br>evaluation, once checked, will involve directly the qualification of suspense<br>"0" in the opportunity. |

| Sources of information | |
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| Basic | CULTIVOS CELULARESBasra, A.S. (2000). Plant growth regulators in agriculture and horticulture. Their role and commercial uses. Ed. Food Products Press. Benítez Burraco, A. (2005). Avances recientes en Biotecnología vegetal e ingeniería genética de plantas. Editorial Reverté.Boulton, A.A. e col. (1992). Practical cell culture techniques. Humana Press.Butler, M. (2008). Animal cell culture and technology. Taylor & Francis, 2nd edition.Collin, H.A. e Edwars, S. (1998). Plant cell culture. Guilford Bios Scientific Publishers.Davis, J.M. (2011). Animal cell culture. Essential methods. Wiley-Blackwell.Doyle, A. e Griffiths, J.B. (2000). Cell and tissue culture for medical research. John Wiley and Sons. Fedoroff, S. e Richardson, A. (1992). Protocols for neural cell culture. Humana Press. Freshney, R.I. (2010). Culture of animal cells. A manual of basic technique and specialized applications. Wiley-Liss, Inc. 6ª Edition.Hammond, J., McGarvey, P., Yusibov, V. (1999). Plant Biotechnology. New products and Applications. Springer Verlag. Loyola-Vargas, V.M. e Vázquez-Flota F. (2006). Plant cell culture protocols. Humana Press. 2nd Edition. Pollard, J.W. e Walker, J.M. (1997). Basic cell culture protocols. Humana Press.Shaw, A.J. (1996). Epithelial cell culture. A practical approach. Oxford University Press. Taji, A., Kumar, P., Lakshmanan, P. (2002). In vitro plant breeeding. Food Products Press.Trigiano, R.N. e Gray, D.J. (2004). Plant development and biotechnology. CRC Press.Tzfira, T. e Citovsky, V. (2006). Agrobacterium-mediated genetic transformation of plants: biology and biotechnology. Curr. Opin. Biotechnol. 17:147?154.Vunjak-Novakovic, G.& Freshney, R.I. (2006). Culture of cells for tissue engineering. Wiley-Liss, Inc.TÉCNICAS DE MICROSCOPÍA E ANÁLISE DE IMAXEWatt, Ian M. (1996). The principles and practice of electron microscopy. Cambridge University PressHoppert, M. (1998). Electron microscopy in microbiology. Bios Scientific PublishersBozzola, John J. (1999).Electron microscopy : principles and techniques for biologists. Jones and Bartlett Publishers.Dykstra, Michael J. (2003). Biological electron microscopy theory, techniques, and troubleshooting. Kluwer Academic/Plenum PublishersRobin Harris. (1991). Electron microscopy in biology a practical approach. Oxford University Press.Hunter, Elaine Evelyn. (1984). Practical electron microscopy a beginner's illustrated guide. Praeger, cop.Slayter, Elizabeth M. (2000). Light and electron microscopy. Cambridge University PressHerman, B. (1998). Fluorescence microscopy. Bios Scientific PublishersDonat-P. Häder. (1992). Image analysis in biology. CRC Press, cop. Pertusa, JF. (2003). Técnicas de Análisis de imagen. Aplicaciones en Biología. Publicaciones de la Universidad de Valencia. CITOMETRÍA DE FLUXOOrmerod, M.G. (2009). Flow Cytometry: A Basic Introduction. 2a Ed. IRL Practical Approach series. Oxford University Press.Shapiro, H.M. (2004). Practical flow cytometry. Wiley-Liss. 4a ed. New York.TÉCNICAS CITOXENÉTICASCzepulkowski, B. (2001). Analyzing chromosomes. BIOS Scientific Publishers, Oxford.Gosden, J.R. (1994). Chromosome analysis protocols. Humana Press, Totowa (New Jersey).Kianian, S.F., Kianian P.M.A. (2016). Plant cytogenetics: methods and protocols. Spinger, New YorlLiehr, T. (2006). Multicolor FISH in human cytogenetics. Karger, Basel.Liehr, T. (2009). Fluorescence in situ hybridization (FISH)-application guide. Springer-Verlag, Berlin.Leitch, A.R., Schwarzacher, T., Jackson, D. (1994). In situ hybridization: a practical guide. Bios Scientific Publishers, Oxford.Verma, R.S. e Babu, A. (1989). Human chromosomes: manual of basic techniques. Pergamon Press, New York. |
| Complementary | - Artigos científicos sobre temas relacionados coa materia proporcionados a través da plataforma Moodle.- Páxinas webXeralPubMed: http://www.ncbi.nlm.nih.gov/pubmedCultivos Celulares-https://inmunomundo.files.wordpress.com/2015/12/cultivo-celular.pdf-http://www.lgcstandards-atcc.org/Citometría-Cytometry: http:www3.interscience.wiley.com/cgi-bin/jhome/33945Microscopía e Análise de imaxehttp://zeiss-campus.magnet.fsu.edu/index.htmlhttp://www.microscopyu.com/tutorials/http://www.olympusfluoview.com/index.htmlhttp://w3.uniroma1.it/MEDICFISIO/microscopy.htmhttp://rsbweb.nih.gov/ij/index.htmlhttp://www.invitrogen.com/site/us/en/home/support/Research-Tools/Fluorescence-SpectraViewer.html |

| Recommendations |
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| Subjects that it is recommended to have taken before |
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| Subjects that are recommended to be taken simultaneously |
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| Subjects that continue the syllabus |
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| **Other comments** |
| Program Green Campus<br>Empower of SciencesTo help to achieve some sustainable immediate surroundings<br>and fulfil with the point 6 of the Environmental Statement of the faculty of<br>Sciences (2020), the documentary works that realise  in this matter:to. They will request <br>mostly in virtual format and computer supportb. To realise  in<br>paper:-they will not employ <br>plastic-they will realise <br>impressions to double expensive-they will employ  paper<br>recycled-they will avoid  the<br>realisation of draftsTo Environmental Statement is available<br>in:https://ciencias.udc.es/images/Facultade/Green_Campus/Regulamento_Comit%C3%A9_Green_Campus_FCiencias.pdf |