CELL CULTURE – PRACTICAL APPLICATIONS

Curricular Unit (CU) characterization

CU name:
Cell culture – practical applications

Scientific area acronym:
BS

Duration:
Modular

Working hours:
58

Contact hours:
30

ECTS:
3

Observations:
Optional CU
Contact hours distributed as follows, according to the schedule to be provided to students: 3 Teoricals; 6 Teorico-practicals; 12 Praticals; 3 Seminar; 6 Tutorials and 2 Evaluation.
Maximum number of students: 10

Teachers in charge of CU:
Ana Armada – 22 hours
Sofia Cortes – 22 hours

Other teachers:
Fernando Cardoso – 15 hours
Fátima Nogueira – 3 hours
Invited teachers – 3 hours

Intended learning outcomes:
1. Acquisition of knowledge related to different types of cell lines and their applications.
2. Identification of good laboratory practices for safely handling cell cultures.
3. Application and manipulation of different animal cell culture techniques.
4. Evaluation of cell viability, using optical microscopy techniques and colorimetric assays.

5. Interpretation of the results obtained from various performed assays.
6. Recognition of the potential of different methodologies in various research fields.

Syllabus:

I. Organizational structure and security of a cell culture laboratory.
II. Cell types, their applications, cell media and substrates.
III. Preparation of culture media and handling of cell cultures.
IV. Cryopreservation of animal cells.
V. Manipulation of cell lines.
VI. Cell viability and cytotoxicity assays.
VII. Basic concepts of immunofluorescence: labeling of nuclear DNA and intracellular proteins.
VIII. Seminar on the application of cell cultures in various research areas.

Evidence of the syllabus coherence with the CU intended learning outcomes:

Learning outcomes 1, 2 and 3 are interrelated with the syllabus topics I to V; outcomes 4 and 5 are associated with syllabus topics VI and VII. Outcome 6 will be covered through its association with syllabus topic described in VIII where the potential and limitations of the techniques discussed in topics 1 to 5 will be critically analyzed by experts in different fields using cell cultures

Teaching methodologies:

This curricular unit (CU) aims to transmit theoretical knowledge and practical skills on the manipulation of eukaryotic cell cultures and associated techniques, with application in various research fields, such as the development of new drugs, which is transversal to the areas of Microbiology, Parasitology and Tropical Medicine.

Theoretical classes will be based on the expositive method; the theoretical-practical classes will use expositive and demonstrative methods; practical classes will apply active and inquiry-based methods. The schedule also includes tutorial sessions to support independent study.

Assessment:

The assessment of this course is based on active participation in practical classes and completion of exercises (20%) and an exam covering theoretical and practical content (80%). Attendance in at least 2/3 of the classes is mandatory and the final grade must be ≥ 9.5 in 20.

For grade improvment or in case of non-approval, students must take a second exam in a specific period.

The assessment of the course and teachers will be conducted through an anonymous student satisfaction survey.

References for consultation / mandatory existence:

- Michael Aschner, Lucio Costa (2019) Cell Culture Techniques, Neuromethods 145, Springer New York; Humana;
- Cornelia Kasper, Verena Charwat, Antonina Lavrentieva (2018) Cell Culture Technology, Learning Materials in Biosciences, Springer International;
- Manual de Segurança Biológica em Laboratório (OMS), 2004. (https://www.who.int/csr/resources/publications/biosafety/BisLabManual3rdwebport.pdf?ua=1);
- Edmondson et al., 2014. Three-Dimensional Cell Culture Systems and Their Applications in Drug Discovery and Cell-Based Biosensors. In: ASSAY and Drug Development Technologies vol. 12 no.4, 207-218.