DIPARTIMENTO DI SCIENZE

COURSE: **Techniques of microscopy and cell culture**			
ACADEMIC YEAR: **2019-2020**			
TYPE OF EDUCATIONAL ACTIVITY: (Basic, Characterizing, Affine, Free choice, Other) **Free choice**			
TEACHER: **Prof. Raffaele BONI**			
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phone: **+39 0971 205017**	mobile (optional):		
Language: **ITALIAN**			
ECTS: **6** (**4** lessons & tutorials/**2** practice)	n. of hours: **56** (**32h** lessons e tutorials/**24h** practice)	Campus: **Potenza** **Dept. Sciences:** **BIOTECHNOLOGY (L2)**	Semester: **I**

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

This course is aimed to train students in the use of optical, electronic, fluorescent and laser confocal microscopy techniques as well as in setting, administering, and using both primary, secondary and continuous cell line cultures. In particular, the knowledge of the different microscopy techniques will be developed through (1) an introduction to the theoretical principles behind each of them; (2) the technical description of the equipment; (3) detailed information on treatments required for the preparation of samples for microscopic investigation (fixation, dissection, staining techniques); (4) image analysis.
The part on cell cultures aims to (1) introduce the basic principles of the technology of cell cultures and show some specific and advanced applications; (2) acquiring skills on design and instrumentation of a laboratory of cell culture; (3) outline the main types of cell culture; (4) define the environmental requirements for the cell culture; and (5) describe cell storage by cryopreservation.

o Knowledge and understanding:
the student must demonstrate that he/she is capable of framing the opportunities and problems associated with the application of simple and advanced microscopy techniques as well as cell culture, culture maintenance and cell culture conservation. The involvement of students during the theoretical lessons and exercises will have the purpose of keeping the focus high and highlighting and resolving any difficulties of comprehension.

o Ability to apply knowledge and understanding:
during the theoretical (frontal lesson) and practical (exercises) learning phases as well as during the final exam, the student should demonstrate that he/she is able to choose the most suitable microscopic techniques to the required diagnostic targets and to identify the potentialities offered by cell cultures . Achieving a diagnostic goal becomes the ultimate result of a discriminatory analysis that necessarily involves information gathered within the student's educational pathway, creating transverse links with courses previously performed. To support this logical path, the students will have to identify any analytical evidence that can confirm their hypotheses.

o Autonomy of judgment:
the student must be able to evaluate and choose the most suitable tools for setting up a proper diagnostic path. Such choices must be made in the respect of the well-being of the individuals considered, of the laws in force and of the principles of bioethics, as well as in the respect of the requirements necessary to avoid biological, chemical and environmental hazards.

o Communicative Skills:
the student should be able to explain in a simple way, even to non-professionals, the opportunities offered by the application of microscopy techniques and cell cultures. In detail of this narrative, arguments of anatomy, histology and cytology applied to animals and humans must be addressed using appropriate scientific language.

o Learning Skills:
At the end of the course, the student must be able to use bibliographic and computer tools to implement the acquired basic knowledge, and to update and enrich his/her knowledge through participation in specialized courses and seminars in the field.

PRE-REQUIREMENTS

None

SYLLABUS

Principles of microscopic analysis
Optical microscopy: preparation and evaluation of biological samples
Fluorescence microscopy: preparation and evaluation of biological samples
Confocal laser microscopy: preparation and evaluation of biological samples
Electron microscopy: preparation and evaluation of biological samples
Image analysis
Basic techniques of cell culture, suspension and monolayer cultures, 3D culture
Quality Control
Protocols for the evaluation of cell proliferation and cell viability
Preparation and storage of culture media
Cryopreservation and storage of cells
Cytotoxicity assay and vitality
Culture of cell lines

TEACHING METHODS

Theoretical lessons, Classroom and Laboratory tutorials.

EVALUATION METHODS

Oral examination

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Class material.
Bruce Alberts: Biologia molecolare della cellula. Zanichelli ed.
Introduzione alle colture cellulari, Mariotti GL et al., Tecniche Nuove, 2010
Culture of Animal Cells: A Manual of Basic Technique. R. Ian Freshney, Wiley-Liss, 2000.
Animal Cell Culture: A Practical Approach. John R. W. Masters, Oxford University Press, 2000.
Animal Cell Culture and Technology. Mike Butler, Michael Butler, Taylor & Francis, Inc., 2004.
Additional on-line material will be shared after approval by the teacher.

INTERACTION WITH STUDENTS

At the beginning of the course, after describing the objectives, the program and the verification procedures, the teacher collects the names and the e-mail addresses of the students. It is a task of the teacher to build a mail-list with which invite students to log in to one of the educational material sharing site, which will be available from the end of the first lesson. Such material can be enriched with in-depth material on the basis of specific needs required by the course.

Weekly reception

day	***from***	***to***	***at***

Tuesday	*16:30*	*18:30*	*Teacher's room*
Wednesday	*16:30*	*18:30*	*Teacher's room*
Thursday	*9:30*	*11:30*	*Teacher's room*

This schedule may be changed due to teaching or academic duties. However, in addition to the scheduled weekly reception, the teacher is always available, when present in his room or lab, for personalized explanations with students, which may be done either by the students receiving as well as by email or phone service.

EXAMINATION SESSIONS (FORECAST)[1]

30/01/2020, 06/02/2020, 13/02/2020, 20/02/2020, 27/02/2020, 05/03/2020, 28/05/2020, 11/06/2020, 09/07/2020, 17/09/2020, 08/10/2020, 17/12/2020.

SEMINARS BY EXTERNAL EXPERTS YES *X* NO □

FURTHER INFORMATION

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.