DESCRIPTION OF THE SUBJECT

Degree/Master in: Master's in MOLECULAR AND CELLULAR BIOLOGY by the University of Málaga
Centre: Faculty of Sciences
Subject: EXPERIMENTAL TECHNIQUES IN CELLULAR AND MOLECULAR BIOLOGY II
Code: 108
Type: Optional
Materia: EXPERIMENTAL TECHNIQUES IN CELLULAR AND MOLECULAR BIOLOGY II
Module: EXPERIMENTAL TECHNIQUES
Modality: Theoretical
Language: Spanish
Year: 1
Semester: 1
Nº of ECTS: 3
Nº of hours of work by student: 75
Size of the Big Group: 0
Size of the Reduce Group 0
Website of the subject: -

TEACHERS

Departament: MICROBIOLOGY
Area: MICROBIOLOGY

Name	Mail	Work phone	Office	Tutoring hours
MARIA DEL CARMEN ALONSO	mdalonso@uma.es	952137588	DMb1 Dpto. Microbiología (Módulo de Biología, planta 1) - FAC. DE CIENCIAS	During the entire course: 11:30 - 13:30, Fridays 11:30 - 13:30, Thursdays 11:30 - 13:30

RECOMMENDATIONS AND ORIENTATIONS

CONTEXT

1. Techniques for culturing and preserving microorganisms

The objective of this part of the subject is to introduce the student to the basic aspects of the techniques used to quantify and preserve different microorganisms: bacteria, viruses (bacteriophages) and fungi.

2. Philosophy of Science.

The Introduction to Contemporary Philosophy of Science aims to provide a minimum understanding of the nature of scientific activity, and how ideas about the limits of such activity have evolved. This knowledge has not been provided throughout the training prior to the master's degree since the current syllabuses of the degrees that give access to this master's degree do not include content in Philosophy of Science.

3. Flow cytometry techniques.

The aim is to provide students with an overview of the fundamentals of flow cytometry and its main applications.

COMPETENCES

Specific Competences

2.6 Understand the main trends in contemporary Philosophy of Science.

2.8 Acquire skills in flow cytometry techniques.

2.9 Acquire skills in microorganism preservation techniques.

2.10 Acquire skills in advanced techniques for the culture and observation of microorganisms.

CONTENT OF THE SUBJECT

Philosophy of Science

Main trends in contemporary Philosophy of Science

Flow cytometry techniques

Theoretical sessions:

- Introduction to flow cytometry techniques
- Sample preparation for flow cytometry
- Applications of flow cytometry

Practical sessions

- Sample preparation
- Introduction to the flow cytometer. Differences between analyser and separator
- Flow cytometry techniques
- Analysis and presentation of results
- Individual work

Techniques for culturing and preserving microorganisms

Theoretical sessions:

- Nutrient requirement for bacterial culture
- Types of culture media
- Isolation of pure bacterial cultures
- Maintenance and preservation of bacteria
- Type cultures and culture collections
- Isolation and preservation of bacteriophages
- Quantification of bacteriophages: direct counting and concentration techniques
- Isolation and quantification of animal and plant viruses
- Conservation of animal and plant viruses
- Culture and preservation of fungi

Practical sessions:

- Culture of microorganisms on different media
- Role of cryoprotective agents in freeze preservation
- Role ofcryoprotective agents in in preservation by freezing
- Direct enumeration of E. coli bacteriophages: double agar layer technique
- Bacteriophage concentration technique: simple filtration. Effect of various factors on viral adsorption to membrane filters.
- Isolation and culture of fungi
- Filamentous fungi preservation in glycerol
- Filamentous fungi preservation in silica gel

TRAINING ACTIVITIES

Face-to-face activities

Other practical activities

Masterclass

ASSESSMENT ACTIVITIES

LEARNING RESULTS / ASSESSMENT CRITERIA

1. Handling and culture of microorganisms

To know how to handle the methodology used in Microbiology.

To acquire the ability to handle microorganisms.

To know and handle the main techniques for counting microorganisms.

To know how to culture microorganisms.

To know the main preservation techniques and which of them are suitable for each type of microorganism.

2. Philosophy of Science

Throughout these topics students think about the fundamental concepts and open debates in contemporary Philosophy of Science, and learn to form an opinion on questions such as the existence of irreducible subjective elements in science, the fundamentally hypothetical nature of science, the historical pattern of development of scientific paradigms, or the social role of science. The assessment is based on an essay prepared by the students of a series of questions addressing these issues. For assessment, students have to write an essay on the basis of a series personal and critical thoughts on the issues addressed, as well as the ability to express these positions in writing.

3. Flow cytometry techniques

As expected learning outcomes, students should be able to orientate themselves in the specialised scientific literature by understanding those results whose experimental basis lies on flow cytometry techniques. In addition, they should be able to realize the possible applications of this technique for their future research work offers for their future research work.

ASSESSMENT PROCEDURE

Assessment procedure

1. Techniques for the culture and preservation of microorganisms.

Continuous assessment will be based on each student laboratory skills and work aptitude. In case of absence in two or more practical sessions, the student will have to write a mini-review on a topic related to the theoretical and practical sessions carried out.

2. Philosophy of Science

Evaluation of an essay written by the students based on a questionnaire on the key topics covered.

3. Flow cytometry techniques

Attendance at face-to-face classes will be assessed.

Evaluation of the work presented by the students individually.

The weight of each of the parts of the subject will be proportional to the number of credits of each of them.

BIBLIOGRAPHY AND OTHER SOURCES

Complementary

A new method for the preservation of fungus stock cultures by deep-freezing. Mycoscience 43: 143-149; Kitamoto, Y.; Suzuki, A.; Shimada, S. and Yamanaka, K.; 2002; artículo de investigación

"American Type Culture Collection Methods: I. Laboratory manual on preservation, freezing and freeze-drying".; Hatt, H. (ed.); American Type Culture Collection; 1980

Biodiversity of fungi. Inventory and monitoring methods; Mueller, G.M.; Bills, G.F.; and Foste M.S. (ed); Elsevier; 2004

"Cryopreservation and freeze-drying protocols"; Day, J.G and McLellan, M.R. (eds.); Humana Press; 1995

"Culture collection and the preservation of bacteria". Methods in Microbiology. Vol. 3.; Lapage, S.P.; Shelton, J.E.; Mitchell, T.G. and Mackenzie, A.R.; Academic Press; 1970

Development of a novel lyophilization protocol for preservation of mushroom mycelial cultures. Current Science 87: 568-570; Singh, S.K.; Upadhyay, R.C.; Yadav, M.C. and Tiwari, M.; 2004

Flow Cytometry, Amped Up Science 332, 677 (2011)

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Introduction to Flow Cytometry; James V. Watson; Cambridge University Press; 2004

"Isolation, purification and maintenance of yeasts". Methods in Microbiology. Vol 4.; Beech, F.W.; and Davenport, R.R.; Academic Press; 1971

Long-term preservation of Podosphaera fusca using silica gel. J. Phytopathology 154: 190-192; Pérez-García, A.; Mingorance, E.; Rivera, M.E.; del Pino, D.; Romero, D.; Torés, J.A. and de Vicente, A.; 2006; artículo de investigación

"Maintaining cultures for biotechnology and industry".; Hunter-Cevera, J.C. and Belt, A. (eds.); Academic Press; 1996

"Maintenance of microorganisms and cultures cells".; Kirsop, B.E. and Doyle, A. (eds.).; Academic Press.; 1991

"Manual práctico de Microbiología"; Gamazo, C.; Lopez-Goñi, I. and Diaz, R.; 9788445815199; Masson; 2005

"Plant viruses and virus diseases"; Baeden, F.C.; 8176220647; Biotech books; 2002

Practical Flow Cytometry, 4th Edition; Howard M. Shapiro; Wiley-Blackwell; 2003

"Preservation of fungi". Methods in Microbiology. Vol. 4.; Onions, A.H.S.; Academic Press. 113-151; 1971

"Storage of stock cultures of filamentous fungi at ¿80°C.: effects of different freezing-thawing methods"; Juarros, E., Tortajada, C., García, M.D. and Uruburu, F.; Microbiología SEM; 1993

"Technical information for culture collections curators in developing countries"; Malik, K.A. (ed.); UNESCO/WFCC Education Committee; 1992

Technique for long-term preservation of phytopathogenic fungi in liquid nitrogen. Phytopathology 73: 241-246; Dahmen H, Staub Th, Schwinn FJ; 1983; artículo de investigación

"The preservation and maintenance of living fungi"; Smith, D. and Onions, A.H.S.; International Mycological Institute.; 1994

The Relevance of Flow Cytometry for Biochemical Analysis. IUBMB Life, 51: 231¿239, 2001. José-Enrique O¿Connor, Robert C. Callaghan, Marta Escudero, Guadalupe

The Relevance of Flow Cytometry for Biochemical Analysis. IUBMB Life, 51: 231¿239, 2001. José-Enrique O¿Connor, Robert C. Callaghan, Marta Escudero, Guadalupe

"The stability of industrial organisms".; Kirsop, B.E. (ed.); Commonwealth Mycological Institute.; 1980

"Virus culture: a practical approach"; Cann,A.; 0199637156; Oxford University Press; 1999

DISTRIBUTION OF STUDENT'S WORK

FACE-TO-FACE TRAINING ACTIVITIES

Description	Hours	Big Group	Reduced Group
Other practical activities	10		
Masterclass	8		
Other exhibition activities	4.5		
TOTAL OF HOURS FACE-TO-FACE TRAINING ACTIVITIES	22.5		

NON-FACE-TO-FACE TRAINING ACTIVITIES

TOTAL OF HOURS NON-FACE-TO-FACE ACTIVITIES	45
TOTAL OF HOURS OF EVALUATION ACTIVITIES	7.5
TOTAL OF HOURS OF STUDENT'S WORK	75

ADAPTATION TO VIRTUAL MODE DUE TO COVID19

Training activities

Scenario A: Face-to-face training activities will be lectures and practical classes in small groups, using the tools available at the Centre. Face-to-face practical sessions may focus on procedures that are essential for acquiring professional competences or that are difficult to supplement with other resources. They may be complemented by non-face-to-face sessions, dealing meaning with different aspects of result presentation and processing.
Regarding on-line training activities, any of the online work tools available on the virtual campus can be used, both synchronous (such as virtual classroom b or other available tools) and asynchronous (videos, presentations with audio in video format...), as well as self-assessment questionnaires, etc. Other virtual interaction platforms can also be used.

Scenario B: Any of the online work tools available on the virtual campus can be used, both synchronous (such as virtual classroom b or other available tools) and asynchronous (videos corresponding presentations with audio in video format...), as well as self-assessment questionnaires, etc. Other virtual interaction platforms can also be used.

Assesment procedure

Scenario A and B
1. Techniques for the culture and preservation of micro-organisms. Attendance at face-to-face and/or virtual classes will be assessed. In the event of non-attendance, the student must complete a bibliographical work on a topic related to the theoretical and practical sessions carried out, on which a plagiarism detection system may be applied. Online questionnaires may be carried out
2. Philosophy of Science. Evaluation of an essay written by the students based on a questionnaire on the key topics covered.
3. Flow cytometry techniques. Attendance at face-to-face and/or online classes will be assessed. Evaluation of the work presented by the students individually face-to-face or online.
The weight of each of the parts of the subject will be proportional to the number of credits of each of them.

Contents

Scenario A and B
The theory content remains unchanged from the initial teaching guide.

Tutorials

Scenario A: Individual tutorials will be carried out face-to-face if possible. Regarding non-face-to-face tutorials, questions raised by students will be answered, during working hours and days, mainly be. If necessary, the use of synchronous tools available on the virtual campus, such as the virtual classroom b or chats, and other virtual platforms for interaction, will be considered.

Scenario B: Questions raised by students ill be answered, during working hours and days, mainly be. If necessary, the use of synchronous tools available on the virtual campus, such as the virtual classroom b or chats, and other virtual platforms for interaction, will be considered.