UNIVERSITÀ DI PISA

MYCOLOGY AND MYCOLOGICAL BIOTECHNOLOGY

SUSANNA PECCHIA

Anno accademico	2021/22
CdS	PLANT AND MICROBE BIOTECHNOLOGIES
Codice	382GG
CFU	6

Moduli	Settore/i	Tipo	Ore	Docente/i
MICOLOGIA E BIOTECNOLOGIE MICOLOGICHE	AGR/12	LEZIONI	64	SUSANNA PECCHIA

Learning outcomes

Knowledge
The student who successfully completes the course will have a solid knowledge of the microorganisms usually named fungi and a basic knowledge about biotechnological applications concerning these organisms. He or she will be able to define the procedure to study the fungi and to exploit their large array of metabolites and physiological functions in agriculture and other fields. He or she will acquire practical skills to manage fungi in a research lab.

Assessment criteria of knowledge
Academic progress will be monitored and verified during the course in the form of talks and meetings with the lecturer.

Skills
The successfull student will have the ability of:
- understanding the role of fungi in natural environment
- understanding the role that fungi can play for agricultural and industrial applications
- planning research and development activities related to fungi
- working in an Applied Mycology lab.

Assessment criteria of skills
During the course periodic discussions are held to ascertain the ability to link and summarise the arguments carried out.
Students will have to prepare and present a written report that documents the results of the activities of the laboratory project.

Behaviors
At the end of the course the student can acquire and/or develop:

- the ability to use the basic tools of an Applied Mycology laboratory
- the ability to address the issues related to the use of biotechnologies in Mycology

Assessment criteria of behaviors
The assessment of behaviors will be carried out mainly during the laboratory exercises evaluating the degree of accuracy and precision of the activities carried out. The ability to solve the practical and theoretical problems posed by the lecturer wil also be evaluated.

Prerequisites
Basic Biology, the eukariotic cell, molecular biology.

Teaching methods

- The lectures are held with the help of slides and with the use of teaching material distributed to all students and discussed collegially with the lecturer.
- The laboratory exercises are carried out in an educational laboratory equipped to carry out applied Mycology exercises.

- The teaching material of both the frontal and laboratory lessons is provided via e-mail or Teams platform to the students by the lecturer.
- Student/lecturer interactions take place through meetings, e-mail or Teams platform.

Syllabus

Fungi and fungus-like organisms. Fungi as modular organisms. The fungal hypha. Filamentous, yeast-like and dimorphic fungi. Hyphal modifications. Fungal growth and morphogenesis. Fungal spores: germination, release and dispersal. Nutrition and metabolism. Primary and secondary metabolism: enzymes, mycotoxins. Environmental conditions for growth. Fungal genetics. Sexuality, heterocariosis and parasexuality. The fungal genome: chromosomes and mini chromosomes, mithocondrial genes, plasmids, transposable elements, viral genes. Basic Systematics : Kingdoms of fungi and fungal-like organisms; main features of Oomycota, Zygomycota, Ascomycota, Basidiomycota and mitosporic fungi with examples. Mycologycal biotechnology and nanobiotecnology: general information and case studies.

Bibliography

- Deacon J.W. – Micologia moderna, Calderini Ed agricole
- Smith J.E. – Biotecnologie, Zanichelli
- Nevalein H. - Grand Challenges in Fungal Biotechnology, Springer Nature Switzerland (selected chapters)
- Donadio S. & Marino G. - Biotecnologie microbiche, Casa Editrice Ambrosiana (capitoli selezionati)
- Hyde K.D. et al. - The amazing potential of fungi: 50 ways we can exploit fungi industrially. Fungal Diversity 2019 - https://doi.org/10.1007/s13225-019-00430-9
- Selected Web sites and social media
- Selected scientific articles will be made available

Non-attending students info

Non-attending students can prepare the oral exam using the teaching material provided by the lecturer and following the lecturer register available online.
Laboratory exercises are mandatory and the attendance is verifyed by the lecturer through a register with signatures in and out.

Assessment methods

During the oral exam the student must be able to demonstrate his/her knowledge of the course material and be able to discuss the reading matter thoughtfully and with propriety of expression. In the practical activities report the student must demonstrate his/her knowledge of the lab course material and to organise an effective and correctly written reply.
Students will take an oral examination and a discussion of the practical activities report at the end of the course. The evaluation of the report takes part in the mark (max 4 points out of a total of 30).

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