Anno Accademico 2021/2022

GENETIC AND MICROBIAL BIOTECHNOLOGIES	
Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/18 (GENETICS)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	ADVANCED BIOTECHNOLOGY
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	1st semester (01/10/2021 - 14/01/2022)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	FERRARI EUGENIO (titolare) - 3 ECTS BARBIERI GIULIA - 3 ECTS
Prerequisites	In order to understand the topics covered in the course, the students must have good knowledge of Genetics, Molecular Biology and Microbiology, as usually acquired during a Bachelor's Degree in Biology or Biotechnology.
Learning outcomes	At the end of the course, the students are expected to know the genetics of microorganisms, the main mechanisms of control of gene expression and the genetic and molecular tools useful for the construction of microbial hosts capable of producing enzymes and molecules of industrial interest. This knowledge will provide the basis for understanding the industrial processes used for producing proteins and compounds of interest in prokaryotic and eukaryotic hosts. The acquired notions will allow the students to understand, critically analyze and present patents and scientific articles covering topics presented during

	the course.
Course contents	Bacterial genetic analysis: origin and inheritance of mutations. The bacterial chromosome: structure, replication and segregation. Plasmids and their properties. Bacterial genetic transfer: transformation and conjugation. Bacteriophages: lytic cycle and lysogeny. The Lambda paradigm and the role of Lysogenic conversion in bacterial pathogenesis. Generalized and specialized transduction. Phages as tools and phage therapy. The CRISPR Cas system and new tools for genome editing. Regulation and global analysis of gene expression in bacteria: operons and regulons. Differentiation in Bacillus subtilis: phosphorelay systems, sporulation, competence and motility. The stringent response. Production in prokaryotic cells: the genus Bacillus. Genetic tools for the construction of producer strains. Production optimization in Bacillus: improvement of the secretion of proteins and enzymes of industrial interest, random mutagenesis and targeted mutagenesis based on genomic, proteomic or single cell studies. Fungal genetics. Yeasts. Production in eukaryotic cells. Proteins production: fermentation. Metabolic pathway engineering. Patents and patentability. Origins and evolution of life. The microbiota.
Teaching methods	The course will include lectures, group work and in-class activities. In addition to reference texts, also articles, reviews and patents will be used to deepen and update the covered topics. The material used during the lessons will be made available on the Kiro platform.
Reccomended or required readings	Henkin T. M., Peters E. Snyder and Champness Molecular Genetics of Bacteria, 5th Edition. 2020. ASM Press, Washington. Donadio S. e Marino G. Biotecnologie Microbiche. 2008. CEA, Milano. Brown T. A. Biotecnologie molecolari, Principi e tecniche, Seconda edizione italiana condotta sulla settima edizione inglese. 2017. Zanichelli, Bologna. The Power Point presentations used during the lessons and the recommended readings will be made available on the Kiro platform http://elearning2.unipv.it/bio/
Assessment methods	The final test will consist in a 25-minute oral presentation of an "original research article" (no review, no case study). The subject of the article must be related to a topic presented in the course. The selected article must be approved by the lecturers. The final test will also include questions about the topics covered during the course. The final evaluation will be based on the ability to critically analyze and present a scientific article. The acquisition of the fundamental concepts of bacterial genetics necessary for the development of biotechnological applications will also be evaluated.
Further information	No additional information
Sustainable development goals - Agenda 2030	no $lbl_legenda_sviluppo_sostenibile