UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

INDUSTRIAL BIOCHEMISTRY

Enrollment year	2021/2022
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/10 (BIOCHEMISTRY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	ADVANCED BIOTECHNOLOGY
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	2nd semester (01/03/2022 - 14/06/2022)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	GUIDETTI GIANNI FRANCESCO (titolare) - 3 ECTS NOLLI MARIA LUISA CESIRA - 3 ECTS
Prerequisites	Basic knowledge of biochemistry and molecular biology. Knowledge of the general concepts about protein structure and function and cell metabolism.
Learning outcomes	The students must acquire the knowledge and the ability to describe the techniques and the strategies for the identification, the production, and the characterization of recombinant enzymes, and for their uses in industry. The students will also be able to describe the scientific and technical basis of monoclonal antibodies and recombinant proteins and their use as therapeutics and advanced diagnostics and a new class of drugs based on cells, so called Advanced Therapy medicinal products, that are contributing to the revolution of medicine of the future.
Course contents	Enzymes as natural molecular machines for advanced applications.

	Purification and characterization of enzymes in the laboratory and on large scale. Advanced applications of enzymes: from biofuels to modern textile industry. Enzymes and microorganisms in the agri-food chain: the production of beer, bread, cheese, wine, fruit juice and sweeteners. Enzymology and enzymes in medicine, from diagnosis to therapy. Monoclonal Antibodies: scientific and technical basis, generation, production, characterization, therapeutic and diagnostic applications. Enzyme Immuno Assay (ELISA), basic concepts and applications. Recombinant proteins: scientific and technical basis, development and production, purification, therapeutic and diagnostic applications. Biotech drugs development, from research to the bed side. The biotech production. Advanced Therapy Medicinal Products (ATMPs). Cell and Gene Therapy, Tissue Engineering, Combined Therapies. ATMPs role in the revolution of medicine. The Quality System in the production of biotech drugs and ATMPs. The production of biotech drugs and GMP rules. In vivo and ex vivo Gene Therapy with CART. The transition from conventional medicine to autologous, personalized, and precision medicine. Rare diseases, their scientific and social role.
Teaching methods	Frontal lessons, seminars held by experts in the field of the biotechnology, guided tours of production plants.
Reccomended or required readings	Enzymes in Industry: Production and Applications. 2007. Wolfgang Aehle (Ed). John Wiley & Sons. Monoclonal antibodies: versatile platforms for cancer immunotherapy. Nature Reviews Immunology 10, 317-327 (May 2010) Therapeutic antibodies: past, present and future. Nature Reviews Immunology 10, 297 (2010) Strategies for the Production of Recombinant Protein in Escherichia coli. Gopal Jee Gopal • Awanish Kumar Springer Science+Business Media New York 2013 Recombinant protein expression and purification: A comprehensive review of affinity tags and microbial applications. Biotechnology Journal :620-34. 2012 Course notes and material provided by the teacher.
Assessment methods	Oral exam to determine student's learning abilities and fluency in presenting scientific topics.
Further information	N/A
Sustainable development goals - Agenda 2030	N/A $lbl_legenda_sviluppo_sostenibile