COURSE (TITLE): Molecular Microbiology

LECTURER:

YEAR and SEMESTER: 1st year, 1st semester

CREDITS (CFU): 6 CFU

SECTOR (SSD): General Microbiology (BIO/19)

ACADEMIC YEAR:

ASSESSMENT: Oral exam

LOCATION: Department of Environmental, Biological and Pharmaceutical Science and Technologies, Via Vivaldi 43, 8100, Caserta, Italy.

COURSE OBJECTIVE

The objective of this course is to provide an overview of cellular microbiology applied to human health. Moreover, the course will give an overview of microbial biotechnology for production of molecules related to human health.

SYLLABUS (overview)

Cross-talk among microbial cells. Interaction of commensal, probiotic or pathogen microorganisms with animal cells and tissues. Microbial biotechnologies: metabolic engineering of microbial strains for biotechnological productions.

SYLLABUS (Detailed description):

First part

Cross-talk among microbial cells: quorum sensing, quorum quenching. Examples of human quorum quenching versus pathogens. The role of bacterial biofilms in chronic infectious diseases.

Host-microbe interaction. The human gut microbiota in health and disease. Commensal and probiotic microorganisms in competitive exclusion mechanisms. Next generation sequencing methods to investigate the human microbiome. Microbial pathogenesis: adhesion and invasion (trigger and zipper mechanisms), type III and IV secretion systems, pathogenicity island, toxins.

Development of multidrug resistance: efflux pumps in pathogenic mycobacteria.

Second part

Characteristics of microbial strains used for heterologous productions. Metabolic engineering of microbial strains for production of vitamins and amino acids. Innovative strategies for search and production of new antimicrobial molecules.

TEXTBOOKS:

Human Microbiota and Microbiome - Advances in Molecular and Cellular Microbiology
Ed. J Marchesi, Cardiff University, UK, 2014.

Cellular Microbiology, P. Cossart, P. Bouquet, S. Normark, R. Rappuoli. ASM Press, 2005.

ADDITIONAL READING:

Scientific research articles and reviews provided by the lecturer