UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Developments and Analyses of Bioprocesses

2223-1-F0802Q042

Aims

The course will treat typical issues of a research and development department of a bioindustrial plant. Implications of project choices on costs and time scheduling will be evaluated.

Knowledge and understanding
The student will gain knowledge of the basics of the organization of an industrial plant; the strategies for optimizing operations and the effects of variations in number / sizing of machinery on the process flow

Applying knowledge and understanding
The student will be able to apply the knowledge acquired during the course to the design of an industrial plant for the production of a biotechnological commodity.

Making judgements
The student will be able to process the acquired knowledge pursuing the best technical choices for process optimization

Communication skills
Use of an appropriate scientific/chemical vocabulary and ability in oral reports

5. Learning skills
Skills in managing a professional grade prcess developing tool.
Skills in literature reading and understanding, skills in the elaboration of interconnections among the course-related knowledge and other subjects related to industrial biotechnology.

Contents

1. Recalls on bioreactor structure and fermentative strategies

2. Case-studies exposition
3. Experimental data practical collection
4. Introduction to managing softwares
5. Development of original process layout for the production of commodity

Detailed program

1. Recalls on bioreactor structure and fermentative strategies.
- The Bioreactor
-Components
- Classical feeding strategies
- Control of main parameters
- Data monitoring and storage
- Performances evaluation
- Process flow: from master cell bank to finite product

2. Case-studies exposition
Analysis of a real case study.

3. Experimental data collection (lab practicals).

4. Introduction to managing softwares (computer lab practicals)
- Process management and simulation
- Integrated process design
- Choice of the equipment size
- Production cycle and scheduling
- Cost assessment and economical evaluation
- Debottlenecking
- Waste management

5. Development of original process layout for the production of commodity (computer lab practicals)

Prerequisites

Background. Microbiology and fermentation chemistry are strongly suggested.
Prerequisites. None

Teaching form

Classroom lectures (35 hours, 5 ECTS): will give the framework to the main issues.
Practicals (10 hours, 1 ECTS): will yield the students a core of experimental data and parameters. Real case studies will be examined also with the contribution of biotech industries.

Finally, each student will develop a personal layout for a biotechnological process, that will be simulated and developed with the aid of a specific software.

Teaching language: italian.

Textbook and teaching resource

Slides.
Available at the e-learning platform of the course, together with registration of web conference lessons held.

Bibliography available at the e-learning platform. .
Reports and research articles
Operative manual for the software SuperPro Design
Elaboration of experimental data

Textbooks.
For general subjects: Basic Biotechnology - C. Ratledge & B. Kristiansen eds- Cambridge Press

Semester

First semester

Assessment method

Oral examination concerning a detailed report describing the layout of a producing plant. The report could be a group-work, has to be a personal proposal based on experimental data obtained by the student. Main focus will be on the consequences of the proposed solution on process feasibility and economics.

Office hours

Contact: on demand by email request to the lecturer

Sustainable Development Goals