



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Esempi di Sviluppo e Analisi di Bioprocessi

2122-1-F0802Q042

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#### 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 process 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

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