Fermentation Processes

1. **Course number and name:** 020BRFCS5 Fermentation Processes

2. **Credits and contact hours:** 2 ECTS credits, 1x1:15 contact hours

3. **Name of instructor:** Dominique Salameh

4. **Instructional Materials:**
   - Strehaiano, P., Salameh, D., Maalouf, M. (2013). Manuel de Microbiologie Industrielle. Edition Faculté des sciences, Université Saint-Joseph. ISBN 9953-455-43-0.
   - Chimie Industrielle, R Perrin et J-P SCHARFF, Masson, Paris.
   - Aide Mémoire Génie Chimique, Emilian Koller, Dunod.
   - Bailey J.E. et Ollis D.F. 1986.Biochemical Engineering Fundamentals. Ed. Mac Graw Hill Book Company. New York.
   - McNeil B., Harvey L.M. 2008. Practical fermentation technology. Ed.Wiley.

5. Specific course information

a. Catalog description:

The methods of microbiology. Microbial growth: analysis. Microbial growth: kinetic analysis. Growth and production reactions.Microbial growth: methods for measuring biomass. The microbial cell: structure and function (diagram). Kinetic analysis of a fermentation. General presentation of metabolism (nutrition; substrates and products). The major metabolic pathways. Microbial processes: Kinetic laws, kinetics of industrial processes. Modeling of fermentation processes: Physiological models, industrial fermentation.

b. Prerequisites: None

c. Required, elective, or selected elective course: Required

6. Specific goals for the course

a. Specific outcomes of instruction:

- Define the fermentation reaction.
- Differentiate the major areas of industrial microbiology and fermentation processes.
- Describe the different parts of a bioreactor.
- Apply the principles of chemical thermodynamics and chemical kinetics to fermentation processes.
- Calculate the fermentation kinetics, draw the kinetic monitoring curves.
- Use microbiological and physico-chemical techniques in a context of industrial fermentation.
- Calculate the physicochemical and dynamic parameters in a microbial reactor.

b. PIs addressed by the course:

(PI)	1.2	1.3	2.1	2.2	6.2
Covered	x	x	x	x	x
Assessed	x	x	x	x	x

7. Brief list of topics to be covered

- Introduction: Industrial Microbiology
- Specific methods of microbiology
- Microorganism and industrial activity
- The bioreactor and its operation
- Phenomenological modeling in a microbial reactor
- Industrial Applications
- **Lab work:** study of the kinetics of *Saccharomyces cerevisiae* growth