Biological Reactors B

Calendar: 5th semester

Contact Hours: T:30,0; PL:30,0; O:7,5

Intended learning outcomes of the curricular unit:
This is a UC of global content. Therefore, it is expected that at the end of the semester the student would know the operation mode of several bioreactors and is able to apply fluid mechanics and bioprocess (mass and energy balances) concepts. In addition, it is also expected the student to acquire some of the basic notions of agitation systems in biological reactors, including mixture and agitation phenomena of fermentation broths, as well as its sterilization.

Syllabus:
1.Introduction to chemical reactors. Introduction to biological reactor project. 2. Microbe kinetics; substrate, product formation and cellular growth kinetics. 3. Ideal reactors: batch reactor, CSTR, piston reactor; association of reactors. 4. Biological reactors: batch and continuous mode.5. Mass transfer in biological systems. Gas-liquid mass transfer in systems with natural and forced convection. Biological reaction and mass transport interaction. External and internal diffusional limitations in microbial aggregates.6-Heat transfer in biological systems- reactor sterilization. 7-Criteria for scale-up and scale-down.

Teaching methodologies (including evaluation)
This UC can be divided into lectures and practical classes for resolution of written exercises. The evaluation of this UC will be performed with a final exam (100%). Students can also perform 2 mini-tests (20%) and a small group work (15%) during the semester. With the latter the students can reduce the final exam evaluation load to 65%.