

Laboratory VB

Calendar: 5th semester

Contact Hours: PL: 45,0; OT:15,0

Intended learning outcomes of the curricular unit:

The objective of this curricular unit is to transmit to the students the necessary knowledge and skills to address and perform experimental work and to analyze the final results. This curricular unit allows the students to become familiar with practical applications of the theoretical concepts acquired in the other curricular units that work at the same time.

Syllabus:

1. Continuous operation mode with an anaerobic digester, for the treatment of a residual water sample for biogas production and carbon removal. 2. Continuous operation mode with a 3 continuous stirred tank reactors (CSTR). 3. Comparison study of two types of continuous reactors a Plug Flow Reactor (PFR) and Fixed Bed Reactor (FBR) for the invertase enzymatic hydrolysis of sucrose in *Saccharomyces bayanus* cells immobilized in calcium alginate, pH 4.5 and 45 °C. This practical activity, requires a preparation class (pump calibration, flow adjustment; experimental parameter determination and cell immobilization) and another session for the operation per se (substrate feed flow effect in the final conversion; determination of the minimum fluidized bed rate (FBR)). 4. Membrane process separation: ultrafiltration for biomass concentration. 5. Separation of biomolecules by ionic exchange chromatography (HPLC) in a given sample.

Demonstration of the syllabus coherence with the curricular unit's intended learning outcomes.

This curricular unit is essentially a practical course that allows the students to become familiar with laboratorial practices and management of real life situations that occur in the application of the theoretical concepts learned in the other curricular units of the same semester. In this context the program of this curricular unit includes 6 experimental works whose subjects are contextualized to the syllabus of the curricular units Separation Processes IIB, Genetic engineering, Instrumental methods of Analysis, Biological Reactors IIB, and Microbial Technology.

Teaching methodologies (including evaluation):

The students will be guided to perform the experimental procedures, being incentivized to open discussions so as to promote their own autonomy and problem-solving skills. Mini-tests will be given before each class, that aim at promoting organization and preparation of the work about to be conducted. The students will one report for each procedure, and will have and maintain a lab book. The evaluation will take into account the behavior and capacities demonstrated during class (25 %), the results of the mini-tests (25 %), the reports (25 %) and the evaluation of the lab book (25 %).

Demonstration of the teaching methodologies coherence with the curricular unit's intended learning outcomes.

It is intended that with this curricular unit, the student will acquire the skills and competences to perform experimental procedures, becoming familiar with good laboratory practices. In this context, it will be endeavored to instigate a sense of awareness about the work they are doing, by means of the mini-tests done before starting the lab procedures, which will promote the habit of prior preparation. With the maintenance of a laboratory book, a sense of organization will be inspired. The acquisition of competences for a good presentation of obtained results will be achieved in the elaboration of reports.