Transport Phenomena II

Calendar: 4th semester

Contact Hours: T: 30,0; TP: 30,0; OT: 7,5

Intended learning outcomes of the curricular unit:
This unit curriculum is intended that students achieve the following objectives: physical and mathematical understanding of the mechanisms of mass transfer (diffusion and convection), acquisition of solid knowledge about transport of a component between phases in contact, understanding of the concept of transfer resistance mass and global resistance, to be able to establish macroscopic and microscopic balances of mass, in different geometries, both in steady state, both in the transient regime, ability to apply concepts acquired in some simple equipment, developing the skill to solve technology problems.

Syllabus:
Diffusion. Definitions of velocities and mass fluxes. Diffusion: 1st Fick's law. Diffusion through a stagnant film. Transient diffusion: 2nd Fick's Law. Diffusion and convection. 2. Convection. The equations of continuity for binary systems. Mass transfer coefficients at low mass transfer rates in one phase. Dimensionless numbers and empirical correlations. Mass transfer in two-phase systems. Overall mass transfer coefficients.

Demonstration of the syllabus coherence with the curricular unit's intended learning outcomes.
This course plays a key role in the course, because is intended to provide the student with solid skills on the mass transport, whose knowledge is essential for many other more specific courses in the technology area. It is further objective of this course the student to instill a critical attitude during the acquisition of knowledge and skills.
In this context, the course is structured into two main chapters, the first concerning the study of transfer by diffusion. In this case the topics are divided into several modules in order to teach in a very deep application of Fick's law in steady state and transient in various geometries. The 2nd chapter deals with the mass transport by convection, and this issue divided into several modules. The following modules cover convection for various geometries and physico-chemical systems of different complexity. This chapter is concluded with technological examples.

Teaching methodologies (including evaluation):
In theoretical classes the fundamental concepts are exposed. Illustrative applications of these concepts are solved. In theoretical/practical classes, the students solve application exercises individual y.
Evaluation: Final examination with a minimum of 9.5 values (0 to 20 values) and 100% weight in the final evaluation.

Demonstration of the teaching methodologies coherence with the curricular unit's intended learning outcomes.
This course develops skill s for calculation of mass transfer processes. The student should be able to apply concepts of mass transfer for biological systems and the physic-chemical systems. To achieve these skills, students will solve problems and will model realistic cases.