Transport Phenomena

1. **Course number and name:** 020PDTCS2 Transport Phenomena

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Name of instructor:** Malek Msheik

4. **Instructional Materials:**
   - Heat and mass transfer, Yunus A. CENGEL
   - Fundamentals of heat and mass transfer, Frank P. INCROPERA
   - Mass transfer operations, Robert E. TREYBAL

5. **Specific course information**
   a. **Catalog description:**
   Identification of mass transfer mechanisms-Formulation of rate equations; Estimate diffusion coefficients for gas and liquid phase binary systems; Determine the molar fluxes for steady-state diffusion of A through stagnant B and for equimolar counter-diffusion; List fluxes through porous solids for the two types of diffusion: molecular and Knudsen; Explain the concept of mass transfer coefficient for turbulent diffusion by analogy with molecular diffusion; Calculate interfacial mass transfer rates as a function of local mass; Define and use global mass transfer coefficients; Define and generate minimum and actual operating curves for steady-state co-current and countercurrent processes.

   b. **Prerequisites:** None

   c. **Required/ Selected Elective/Open Elective:** Required

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
   - Understand the different transport phenomena, their interconnection and the means of mass transfer.
   - Being able to identify the type of mass transfer in some engineering situations, which allows to deduce diffusion coefficients and transfer rates.

   b. **PIs addressed by the course:**

PI	1.1	1.3
Covered	x	x
Assessed	x	x

7. **Brief list of topics to be covered**
   - Identification of mass transfer mechanisms
   - Learn velocity equations
   - Estimation of diffusion coefficients for binary systems in gas and liquid phases
   - Determination of molar fluxes for steady-state diffusion of A through stagnant B and for equimolar counter-diffusion

- Listing fluxes through porous solids for both types of diffusion: molecular and Knudsen
- Explanation of the concept of mass transfer coefficient for turbulent diffusion by analogy with molecular diffusion
- Calculation of interfacial mass transfer rates based on local mass
- Definition and use of overall mass transfer coefficients
- Definition and generation of minimum and actual operating curves for co-current and counter-current processes in steady-state.