

## Mass and Energy Balances

1. **Course number and name:** 020BMECS1 Mass and Energy Balances

2. **Credits, contact hours:** 6 ECTS credits, 3x1:15 contact hours

3. **Name of instructor:** Jihane Rahbani (Coordinator)

4. **Instructional Materials:**

- Bilan matière et énergétique pour l'ingénierie chimique. Principes et applications pratiques; Ghasem, Henda; Sciences de l'Ingénieur; De Boek. 2012.

5. **Specific course information**

a. **Catalog description:**

Process units and degrees of freedom analysis; Material balances on single unit processes; Calculations on multi-unit processes; Mass balances in processes with reaction; Multiple systems with reaction, recycling and purging; Energy balance in the absence of reaction; Energy balances with reaction; Mass and energy balances under transient conditions;

b. **Prerequisites:** 020TH2NI3 Thermodynamics 2

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

6. **Educational objectives for the course**

a. **Specific outcomes of instruction:**

- Apply knowledge of basic science and engineering fundamentals to solve material and energy balances.
- Create representative process flow diagrams and use them to organize systems of equations.
- Derive energy balances for chemical processes and integrate with material balance calculations to solve for energy inputs and/or outputs.
- Analyze and solve material and energy balances for steady state, single and multi-unit processes without reactions.
- Analyze and solve material and energy balances for steady state, single and multi-unit processes with reactions.
- Analyze and solve material and energy balances for transient state.

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

PI	1.1	1.2	1.3
<b>Covered</b>	x	x	x
<b>Assessed</b>	x	x	x

7. **Brief list of topics to be covered**

- Process Units and Degrees of Freedom Analysis
- Material balance around single process units
- Material balance calculations: multiple units

- Material balance around reacting systems
- Material balance around reacting systems with recycle, by pass and purge streams
- Energy balance without chemical reaction
- Energy balance with chemical reactions
- Material and Energy balances in transient conditions
- Ideal reactors