University of Jordan
School of Engineering
Chemical Engineering Department

1. **Course code and name:** (0905211) Chemical Engineering Principles I
2. **Class schedule:** 3 Credits Hours
3. **Instructor:** Dr. Linda Al-Hmoud
   a. Office: CHE 305
   b. Email address: l.alhmoud@ju.edu.jo, linda.ju14@gmail.com
   c. Office hours: Sun 10:00 – 11:00, Mon 10:00-11:00, Tue 11:00 – 12:00
4. **Text book:** R. M. Felder and R.W. Rousseau, *Elementary Principles of Chemical Processes*, 3rd Edition, Wiley, New York (2005).
5. **References:**

   Book: D.M. Himmelblau and J.B. Riggs, Basic Principles and Calculations in Chemical Engineering, 7th Ed., Prentice Hall.

   Journals:
   - Chemical Engineering Journal: http://www.journals.elsevier.com/chemical-engineering-journal/
   - Chemical Engineering Science: http://www.journals.elsevier.com/chemical-engineering-science

6. **Website:** http://eacademic.ju.edu.jo/l.alhmoud
   Your **e-learning** account (https://elearning.ju.edu.jo/)
   Live streaming platform: Microsoft TEAMS

7. **Course information:**
   a. **Catalog description**: The scope of chemical engineering, chemical processes units and dimensions, conversion of units. Systems of units, dimensional homogeneity, process data representation data analysis, processes and process variables, process representation and flow sheeting. introduction to material balances, degrees of freedom analysis, material balances for single and multiple non-reactive systems, material balance for reactive systems. Ideal Gases, real gases: compressibility and equation of states. single component AND two-phase systems (vapor pressure). Gas-liquid systems. The phase rule and vapor-liquid equilibria. Liquids and gases in equilibrium with solids.
   b. **Prerequisite:** (0303101) General Chemistry 1
   c. **Course classification**: Mandatory course in the B.Sc. program.

8. **Specific goals of the course:** This course is devoted primarily to the basic principles of chemical engineering. Upon the successful completion of the course, the student will be able to:
   - Differentiate between chemistry and chemical engineering
   - Convert quantities/equations from one set of units to another
   - Perform interpolation/extrapolation of tabulated data, and curve fitting using graphical method
   - Deal with rectangular and logarithmic scales in curve fitting and the corresponding graphical representation
   - Define, calculate, and estimate process variables including fluid density, flow rates, chemical composition of mixtures (mass fractions, mole fractions, and concentrations), pressure, and temperature
   - Classify the process as batch/semi-batch/continuous and as reactive/nonreactive
   - Draw and completely label process flowchart from verbal process description
   - Carry out degree-of-freedom analysis for the completely labeled process flowchart
   - Write and solve material balance equations for single-unit and multiple-unit reactive/nonreactive processes
   - Understand the significance of the recycle, bypass, and purge streams and solve material balance equations for processes that have such streams

- Perform pressure-volume-temperature calculations for ideal and real gases
- Incorporate vapor/liquid, solid/liquid, and liquid/liquid equilibrium concepts into material balance calculations
- Know if he or she has chosen the right field of study

9. Course topics: Course topics will be covered through 42 (50 minutes) classes according to the following distribution:

Topic	# of classes
What is chemical engineering?	1
Units, Dimensions and dimensional consistency, Process data presentation and analysis	4
Process variables	5
Material balances on non-reacting systems	5
Material balances on multi-unit processes, with recycle, by-pass and purge calculations	3
Chemical reactions stoichiometry and material balances on reactive processes	6
Material balances on systems with combustion reactions	3
Singles phase systems: solid and liquid densities, ideal gases and EOS for non-ideal gases	6
Material balances on multiphase systems: vapor/liquid, solid/liquid, or liquid/liquid operations.	9

10. Policies and procedures:

- Students are expected to **attend each class session** and they are responsible for all material, announcements, and schedule changes discussed in class. The university policy regarding the attendance will be strictly adhered.
- All cases of academic dishonesty will be handled in accordance with university policies and regulations.
- You are encouraged to use **computer softwares** such as EXCEL, MATLAB, or POLYMATH to perform the required computations and to represent your findings in graphs or tables.

11. Instructional methods:

Lectures, class discussions, and in-class problem solving

12. Assessment & Grading:

A weighted average grade will be calculated as follows:

Quizzes [2]	:	12%
Project & e-Participation	:	8%
Midterm examinations	:	30%
Final examination	:	50%
Total	**:**	**100%**

13. Contribution of Course to Meeting the Professional Component:

This course contributes to building the fundamental concepts in fluid mechanics and its applications in Chemical Engineering.

14. Relationship to Program Outcomes:

1	2	3	4	5	6	7
✓	✓					