University of Jordan
School of Engineering
Chemical Engineering Department

1. **Course code and name:** (0905212) Chemical Engineering Principles II
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
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 (2019)**: Forms of energy, the first law of thermodynamics. Energy balance on a closed system. Steady-state energy balance on open systems and mechanical energy balance. Energy balances on non-reactive and reactive systems. Simultaneous material and energy balances. Balances on transient systems. The course has 2 credit hours in class and 1 credit hour as a laboratory computer work using available software in which they build flow sheets and solve mass/energy balances of various chemical engineering processes, combustion, heat of reactions, solutions.
   b. Prerequisite: (0905211) Chemical Engineering Principles 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 closed & open system, isothermal & adiabatic process, flow & shaft work, define the reference state, and know how & when to apply Bernoulli equation. [O1]
   - Calculate dry and wet bulb temperature, humid volume, adiabatic cooling, and use Psychrometric chart. [O1]
   - Formulate and apply material and energy balances on nonreactive systems. [O2]
   - Find and calculate heat of reaction for exothermic & endothermic reactions, using heat of formation and heat of combustion methods. [O1]
   - Perform material and energy balance calculations on a chemical reactor, and solve them for different reactive systems. [O2]

9. Course topics: Course topics will be covered through 28 (50 minutes) classes according to the following distribution:

Topic	# of classes
Forms of Energy: The First Law of Thermodynamics, Kinetic and Potential Energy, Energy Balances on Closed Systems, Flow Work and Shaft Work, Specific Properties and Enthalpy, The Steady-State Open-System Energy Balance, Reference States and State Properties, Steam Tables, Energy Balance Procedures, Mechanical Energy Balances	9
Elements of Energy Balance Calculations, Changes in Pressure at Constant Temperature, Changes in Temperature, Estimation of Heat Capacities, Energy Balances on Single-Phase Systems, Phase Change Operations, Energy Balances on Processes Involving Phase Changes, Psychrometric Charts, Adiabatic Cooling, Heats of Solution and Mixing, Balances on Dissolution and Mixing Processes, Enthalpy–Concentration Charts	10
Heats of Reaction, Hess's Law, Heats of Formation and Heats of Combustion, Energy Balances on Reactive Processes/General Procedures, Processes with Unknown Outlet Conditions: Adiabatic Reactors, Fuels and Their Properties, Adiabatic Flame Temperature	9

During the laboratory computer work, the following topics will be covered:

Topic	# of labs
Basics of MATLAB	6
Basics of CHEMCAD	6
Presenting Group Projects	2

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 software** 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%
Group Project & 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 thermodynamics and their applications in Chemical Engineering.

14. Relationship to Program Outcomes:

1	2	3	4	5	6	7
✓	✓					

Date 20-9-2025